In Reply Refer to:
AESO/SE
2-21-00-F-344 June 6, 2001

John McGee, Forest Supervisor
Coronado National Forest
300 West Congress Street
Tucson, Arizona 85701

Dear Mr. McGee:

Enclosed is the Fish and Wildlife Service's final biological opinion and conference opinion on the effects to Sonora chub (*Gila ditaenia*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), and the proposed Chiricahua leopard frog (*Rana chiricahuensis*) from the proposed livestock grazing and its management on the Montana Allotment on the Nogales Ranger District, Santa Cruz County, Arizona. Your July 13, 2000, request for formal consultation and formal conference pursuant to the Endangered Species Act of 1973, as amended was received July 14, 2000. By letter of July 21, 2000, we responded informing you that formal consultation had been initiated. On October 3, 2000, we requested a 60-day extension for the consultation. On January 24, 2001, we received a letter from the Coronado National Forest requesting a draft biological opinion for the formal consultation in order to provide the applicant the opportunity to comment. A 60-day extension was requested which extended the formal consultation period to March 26, 2001. The applicant agreed to the extension in a letter dated January 29, 2001. On March 9, 2001, the Service issued a draft biological and conference opinion to the Coronado National Forest. On May 8, 2001, the Service received the comments on the draft document. Due to the extensive nature of the comments, the Service requested a 30-day extension in order to issue the final opinion.

This biological opinion is based on the information provided in the following documents: the September 7, 1999 environmental assessment, the July 7, 2000 biological assessment for the Sonora chub, the July 10, 2000 biological assessment for the lesser long-nosed bat and the Chiricahua leopard frog, information received from the applicant through the Coronado National Forest, and data in our files and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern or other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

Previous consultations and Relationships to this Biological Opinion

Forest Service Land and Resource Management Plans (Forest Plans) provide guidance and direction for managing National Forests and Grasslands for a 10-15 year period. The plans establish goals, objectives, standards and guidelines for multiple-use and sustained-yield management of renewable resources. Standards and guidelines for the management and conservation of threatened, endangered, and proposed species, including proposed and designated critical habitat, are included in the Forest Plans. Forest Plans provide direction for the protection and enhancement of all threatened, endangered, and proposed species' populations, and habitat proposed or designated as critical, site-specific evaluation of all projects and activities, and initiation of consultation with the Service, as appropriate. These plans, as amended, also contain guidance specific to grazing actions and threatened and endangered species. Certain aspects related to ongoing grazing activities have been considered as part of previous consultations on the Plans and their amendments for the eleven National Forests and National Grasslands of the Forest Service's Southwestern Region. Forest Plan consultations did not include an evaluation of site-specific effects to listed species that may result from the continuation of ongoing domestic livestock grazing. However, the Forest Plans, as amended, and the resulting biological opinions issued by the Service, did provide general and species specific guidance to be incorporated into site-specific grazing management decisions.

The Coronado National Forest Plan (USFS 1985) was the subject of a formal section 7 consultation, resulting in a biological opinion dated December 6, 1985 (2-21-83-F-012). Numerous grazing improvement projects (e.g., pipelines, fences), grazing permits, and allotment management plans on the Coronado National Forest have undergone site-specific formal and informal consultation. Other actions on the Forest that might affect the environmental baseline have also been through consultation.

On February 6, 1998, the Regional Director of the Service's Southwest Region and the Acting Regional Forester of the Forest Service Southwestern Region signed a consultation agreement that defined the process, products, actions, and schedule for completion of consultation for the ongoing site specific grazing activities on an allotment-by-allotment basis in the Forest Service Southwestern Region. The management of ongoing grazing is administered under Forest Plans, and annual operating plans. The primary focus of the Ongoing Grazing Activities on Allotments of the Southwestern Region of the Forest Service was ongoing grazing on 158 allotments identified in civil cases: *Forest Guardians v. United States Forest Service and Daniel Glickman, U.S. Department of Agriculture*, CIV97-2562 PHX-SMM, filed December 12, 1997, and *Southwest Center for Biological Diversity, et.al v. U.S. Forest Service, and Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto National Forests*, CIV97-666 TUC-JMR, filed October 23, 1997. Ongoing grazing activities on additional allotments would be considered as time and resources were available (without compromising the time-line established in the consultation agreement for consultation on the 158 allotments). These two lawsuits were filed against the Forest Service's noncompliance with the Endangered Species Act of 1973, as amended (ESA), for not consulting with the Service on threatened and endangered species.

On February 13, 1998, the Forest Service requested initiation of formal consultation on their on-going and long-term grazing program. The consultation initiation package contained the basic information required to begin formal consultation and included the "Grazing Guidance Criteria for Preliminary effects Determinations for Species Listed as Threatened, Endangered, or Proposed for Listing" dated February 13, 1998. As provided for in the consultation agreement, additional information, including an allotment-by-allotment assessment of the effects to listed species and summary cumulative effects analysis were provided in a supplemental biological assessment dated May 1, 1998.

The Service responded (March 5, 1998) with a concurrence on the use of the guidance criteria with conditions. These conditions included: additional criteria for evaluations of effects to listed fish, lesser long-nosed bat, and Mexican long-nosed bat; maintaining an administrative record for each allotment which supports the "may affect, not likely to adversely affect" determination; and that within six months, the Forest Service and Service would meet to review a sample of the determinations made using these criteria. The Service amended their concurrence letter March 31, 1998, to include a technical clarification. National Forests applying the Guidance Criteria are responsible for documenting how criteria have been met for "not effect" and "may affect, not likely to adversely affect" determinations. These individual allotments where the criteria have been met satisfy informal section 7 consultation requirements.

A biological opinion (000091RO) on livestock grazing on 21 allotments in the Southwest Region was completed on February 21, 1999. The duration of this opinion was for a three- year permit. Two allotments on the Coronado National Forest were included in that consultation, the Montana Allotment and the Bear Valley Allotment.

On July 13, 2000, we received a letter was received from the Coronado National Forest Supervisor's Office requesting formal consultation on the Montana Allotment Management Plan for the Nogales Ranger District.

On July 21, 2000, we sent a letter was sent back to Coronado National Forest in response to the request for formal consultation informing the Coronado National Forest they were in formal consultation as of that date. The Coronado National Forest was informed that they would receive a biological opinion on October 24, 2000.

During the consultation process the Service received additional information on the Montana Allotment from the permittees through the Forest Service. This information was considered in the formulation of this biological opinion.

In October, the Service requested an extension on the due date for the biological opinion for the Montana Allotment, due to workload in the Tucson Suboffice. The new due date for the final biological opinion was moved up to January 24, 2001.

On January 24, 2001, the Service received a letter from the Coronado National Forest requesting a draft biological opinion for the formal consultation. In order to provide the applicant the opportunity to comment, a 60-day extension was requested which extended the formal consultation period to March 26, 2001. The applicant agreed to this extension in a letter dated January 29, 2001.

On March 9, 2001, a draft biological and conference opinion was issued to the Coronado National Forest. On March 13, 2001, the Coronado National Forest received the draft document.

On May 8, 2001, the Service received comments from the Coronado National Forest on the draft biological and conference opinion.

On May 15, 2001, the Service requested a 30-day extension to complete the final document. The due date for the final biological and conference opinion is June 18, 2001.

BIOLOGICAL OPINION

I DESCRIPTION OF THE PROPOSED ACTION

The Nogales Ranger District of the Coronado National Forest proposes to issue a new livestock grazing permit for the Montana Allotment. The life of the permit is 10 years. The permittees on the allotment, Jim and Sue Chilton, are the applicants in this consultation. The purpose of the proposed action is to implement Forest Service policy pertaining to livestock forage, to authorize livestock grazing on the Montana Allotment, to provide long-term management direction through an allotment management plan (AMP), and to reduce the differences between existing and desired condition. The current grazing management plan was established in a 1988 allotment management plan. Various management adjustments have been made since, leading to the present grazing management plan.

The proposed action is for a permit consisting of 400-500 cow/calf pairs to graze the Montana Allotment year round. The management system is a 4 pasture rest-rotation system. The livestock will graze the Chiminea pasture from November 1 through April 30, the Ruby pasture May 1 through mid-July, and either the Warsaw or Schumaker pasture mid-July through mid-October. The livestock would then be moved back through the Ruby pasture to the Ruby trap in October and back into the Chiminea pasture in November. The pasture use dates are approximate. Actual rotation will be based on utilization of key species in key areas rather than dates.

A riparian pasture is proposed for development in lower California Gulch area of Schumaker pasture. The riparian pasture is approximately 283 ha (700 ac). While the livestock are in the Schumaker pasture, approximately 10 percent of them will be placed in the riparian pasture. This stocking approximation may be adjusted once implementation is in place and use and effects can be reevaluated over time. The dates are for general information but the actual pasture rotation will be based on utilization of key species in key areas rather than dates. However, livestock will not be moved into the Schumaker or Warsaw pastures until there is good rain distribution and grasses begin growing in the uplands, and Chiminea pasture will not be utilized until approximately November 1.

The allowable use of all upland species in all pastures will be set at a maximum of 45 percent weight of current year's growth. This will be measured on key species (hairy grama and sideoats grama) in key areas. The guidelines for identifying key ungulate monitoring areas will normally be 0.40 to1.6 km (1/4 to 1 mi) from water, located on productive soils on level to intermediate slopes, and be readily accessible for grazing. Size of the key forage monitoring areas could be 8.0 to 202 ha (20 to 500 ac). Within these key areas selection of appropriate key species will be made for monitoring allowable use.

There will be a maximum use limit of 30 percent of apical meristems of riparian trees and shrubs (up to 1.8 m (6ft) in height) in the riparian pasture. The key species in the riparian pasture, deergrass, will be measured by stubble height with a minimum stubble height of 35.5 cm (14 in) remaining when the livestock are removed from the pasture. When any of these levels are reached the livestock will be moved to the next pasture of use. Once the livestock leave the riparian pasture they will either be moved to the east side of Schumaker pasture or the Ruby trap. However, if the District Ranger determines the next pasture is not ready to be grazed, the livestock will be moved off the allotment.

The following developments are proposed:

1. Fencing of the Bill Ewing area
2. Fencing of the Mujeres tank
3. Development of Schumaker Spring, to help provide an additional water source
4. Establishment of a riparian pasture in the California Gulch area of Schumaker pasture.

The Coronado National Forest will implement two monitoring plans; an annual and a 5-year plan. Resource conditions will be monitored for improvement in both upland and riparian areas. Monitoring points will be established in all pastures. Under the annual monitoring plan key areas will be identified and monitored according to the Coronado's Land and Resource Management Plan. It will be the responsibility of the Nogales District Ranger and the permittees to ensure livestock use levels stay below 45 percent in the uplands and 30 percent in the riparian pasture. Production cages will be placed randomly in key areas as well. A final report will be produced using the monitoring data collected. The 5-year monitoring plan will incorporate photo points in key areas; Mujeres, Bill Ewing, and lower California Gulch to document current conditions. The District Ranger and the Forest Hydrologist will develop a baseline data set from these photo points. These data will reflect riparian conditions, upland vegetation conditions, and stream channel functions in lower California Gulch. In the 5th year these data will be replicated and compared to the original baseline data to determine if the resources are improving and, if not, where there are any extraordinary circumstances. The District Ranger will approve any adjustments that may be needed. The 5-year monitoring will assess improvements of upland vegetation and riparian conditions.

If resource conditions do not show improvements in the riparian pasture as well as upland sites, the growing season utilization will be reduced to 35% and the permit will be modified to 300-400 cow/calf pairs.

The Montana Allotment is within existing habitat for the threatened Sonora chub, endangered Lesser long-nosed bat, and the proposed threatened Chiricahua leopard frog. The Coronado National Forest proposes to implement the following conservation measures: establish the Schumaker riparian pasture, maintain two exclosures, and promote and enhance existing Sonora chub habitat in lower California Gulch. The standards in the Coronado National Forest plan require that forage use by grazing ungulates be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species. The installation of a new border fence at the very southern portion of lower California Gulch will help to alleviate trespass of livestock from Mexico and provide additional protection to existing Sonora chub habitat. Developing Schumaker Spring to provide an additional water source for livestock, and fencing off the Bill Ewing area and Mujeres tank will alleviate the additional impact from livestock, and help distribute livestock more evenly on the east side of Schumaker pasture.

II. STATUS OF THE SPECIES (Rangewide)

Sonora chub (*Gila ditaenia*)

The Sonora chub was listed in the United States and Mexico as threatened on April 30, 1986 (51 FR 16042) with critical habitat. The species is also listed by the State of Arizona as a "species of special concern" (AGFD 1996), as a threatened species by the Republic of Mexico (Secretaria de Desarrollo Social 1994), and included on the Regional Forester's list of sensitive species (USFS 1999b). Critical habitat was designated at the time of Federal listing to include Sycamore Creek, extending downstream from and including Yank Spring (= Hank and Yank Spring), to the International border. Also designated was the lower 2.0 km (1.2 mi) of Penasco Creek, and the lower 0.4 km (1/4 mi) of an unnamed stream entering Sycamore Creek from the west, about 2.4 km (1.5 mi) downstream from Yank Spring. In addition to the aquatic environment, critical habitat includes a 12 m (39.3 ft)-wide riparian area along each side of Sycamore and Penasco Creeks. This riparian zone is believed essential to maintaining the creek ecosystem and stream channels, and to conservation of the species (USFWS 1986). Sonora chub is locally abundant in Sycamore Creek, although the habitat is limited in areal extent (Minckley and Deacon 1968). In Mexico, it is found in the rios Magdalena and Altar where it is considered relatively secure (Henderickson and Juarez-Romero 1990). In 1995, Sonora chub were found in California Gulch by the Arizona Game and Fish Department (AGFD 1995).

The overall estimated current chub habitat is 16.1 km (10 mi) stream miles in Sycamore Creek and California Gulch including a 12m wide riparian area along each side of Sycamore and Penasco creeks. A recovery plan was written in October 1992, for the Sonora chub. One of the conservation efforts provided deals with all the waters occupied by the Sonora chub in the United States that are within the Coronado National Forest and about one-half of the drainage is within the Pajarita Wilderness and Goodding Research NaturalArea (RNA). These special designations were placed on the area because it had a biological community characterized by Mexican floral and faunal elements that did not otherwise occur, or where elsewhere rare, in the United States (Goodding 1961, Curran 1973, Smith 1984, USFS 1988b). Management direction for these special units is to maintain the area in climax vegetation. Removal of minerals, livestock grazing, use of motorized vehicles, and harvest of timber or fuelwood is not permitted, and recreation is limited to non-developed and dispersed use. Livestock grazing is permitted within Pajarita Wilderness outside of Goodding Research Natural Area (RNA). This management direction is applicable to Sycamore Canyon portions of habitat within the Gooding RNA and /or wilderness. The remainder of Sycamore drainage and California Gulch is open to multiple uses (USFS 1988a).

Sonora chub is a stream-dwelling member of the minnow family, Cyprinidae, and can achieve total lengths of 200mm (7.8 in) (Hendrickson and Juarez-Romero 1990). In the United States, it typically does not exceed 125 mm (5.0 in) (Minckley 1973), although specimens up to 150 mm (6.0 in) have been measured (J. Carpenter, FWS, pers.com). The Sonora chub has 63 to 75 scales in the lateral line, and the scales bear radii in all fields. The mouth is inferior and almost horizontal. There typically are eight rays in the dorsal, anal, and pelvic fins, although the dorsal fin can have nine (Miller 1945), and the anal and pelvic fins seven (Rinne 1976). The body is moderately chubby and dark-colored, with two prominent, black, lateral bands above the lateral line (whence the specific epithet, ditaenia) and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

Sonora chub spawn at multiple times during spring through summer, most likely in response to flood or freshets during the spring and summer rains (Henderickson and Juarez-Romero 1990). Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic waters in Mexico, Henderickson and Juarez-Romero (1990) found it commonly in pools less than 0.60 m (2 ft) deep, adjacent to or near areas with a fairly swift current, over sand and gravel substrates. It was less common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept in exploiting small marginal habitats, and can survive under severe environmental conditions. It is also apparent that they can maneuver upstream past small waterfalls and other obstructions to colonize newly-wetted habitats (Carpenter and Maughan 1993).

Based on collection dates of young-of-the-year (YOY), spawning occurs in early spring (Minckley 1973). Larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November, however, which indicated breeding was apparently not limited by season. Adults with breeding coloration were also taken during these periods (Hendrickson and Juarez-Romero 1990). In Sycamore Creek, adults with breeding colors were seen from April through September in 1990 and 1991. Larvae and juveniles 15 to 18 mm (0.6 to 0.7 in) were seen in April, May, and September (Carpenter 1992) suggesting that spawning occurred after the spring and summer rains. Bell (1984) also noted young after heavy flooding, and suggested that post-flood spawning is a survival mechanism evolved by this species. During spawning, Sonora chub apparently broadcast its eggs onto fine gravel substrates in slowly flowing water, where the eggs develop and hatch. There are no nests built nor parental care given. Larvae likely use shallow habitats at pool margins where they feed on microscopic organisms and algae. As adults they can exploit shallow to deep pools, and runs and riffles as available. In 2000, apparent multiple spawning in California Gulch was documented (USFS 2000).

Potential threats to Sonora chub are related to additional watershed developement. Continued and increased grazing and mining operations in upstream watersheds could result in increased siltation and runoff, increased water demand and withdrawl, and introduced pollutants to the stream. Livestock grazing in riparian areas is usually detrimental to fish habitat. Predation by nonnative vertebrates is also a threat to populations of Sonora chub. Green sunfish is a known predator on native fish in Arizona (Minckley 1973), and has been implicated in population changes in other lotic fish communities (AGFD 1988). Hendrickson and Juarez-Romero (1990) noted smaller populations of Sonora chub in areas where nonnative fishes were present. Sonora chub was absent when nonnative predators were abundant in reservoirs and highly modified stream habitats. Bullfrogs, common in the California Gulch watershed have also been implicated in the disappearance of native frogs and fishes in other western aquatic habitats (AGFD 1988).

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered on September 30, 1988 (53 FR 38456). No critical habitat has been designated for this species. The lesser long-nosed bat is a small, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations to feed on nectar from the flowers of columnar cactus, such as the saguaro and organ pipe cactus and from paniculate agaves, such as Palmer's agave, *Agave palmeri*, and Parry's agave, *A. parryi* (Hoffmeister 1986), *A. desertii* (Engelman 1875), and *A. schotti* (Engelman 1875). Palmer's agave exhibit many characteristics of chiropterophily, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (though not all) of these same morphological features (Gentry 1982).

The lesser long-nosed bat is migratory and found throughout its historic range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991); the bat has only rarely been recorded outside of this time period in Arizona (Fleming 1995, Hoffmeister 1986). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (pers. comm. Snow 1999) but also occur with adult females and young of the year at maternity sites (Fleming 1995). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which typically occurs on rocky slopes or hill tops, scattered within the desert grassland and oak woodland communities within the elevation range of 900 m to 1,800 m (3,000-6,000 ft) (Gentry 1982). Parry's agave reaches higher elevations than Palmer's, extending from grasslands into oak woodland, chaparral, pine/oak forests, and mixed conifer with an elevation range of approximately 1,500 m to 2,500 m (4,900-8,200 ft) (Gentry 1982). Like Palmers' agave, Parry's is typically found on rocky slopes (Gentry 1982). Concentrations of paniculate agaves are generally found on the rocky, shallow soils of hills and ridges. Palmer's and Parry's agaves are also found scattered in areas of deep, heavy soils within grasslands or where there may be thick stands of shrubs, mesquite, oak, and other trees.

The importance of Parry’s agave, as well as desert agave and amole, as a forage resource for *Leptonycteris* bats is unknown. As discussed, Parry’s agave generally occurs at higher elevation than Palmer’s agave, and occurs in forest openings. Benson and Darrow (1982) note that it typically flowers in June and early July, which is before the lesser long-nosed bat arrives at roosts in southeastern Arizona. However, J. Rorabaugh (Arizona Ecological Services Field Office, pers. comm., 1998) noted many Parry’s agave in flower high in the Huachuca Mountains on the crest trail during late July in 1997. It may be that agaves at high elevation bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August. In addition, Parry’s agave may be very important as a forage plant for those bats which arrive in southeastern Arizona during late spring and early summer.

As indicated above, the lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves are high energy foods. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, desert grasslands and shrublands, and into the oak woodland (Gentry 1982). In the Huachuca Mountains, Parry’s agave is generally found at higher elevations than Palmer’s agave; the former is common in forest openings to the crest of the Huachuca Mountains.

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (Fleming 1995). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, the species appears to be sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

Known major roost sites include 16 large roosts in Arizona and Mexico (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats and of these, just over 100,000 are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Petryszyn 1991). The numbers above indicate that although a relatively large number of these bats are known to exist, the relative number of known large roosts is quite small. Disturbance of these roosts, or removal of the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

Potential threats to the lesser long-nosed bat are excess harvesting of agaves in Mexico, the collection of cacti in the U.S., and the conversion of habitat for agricultural uses, livestock grazing, wood-cutting, and other development may contribute to the decline of long-nosed bat populations. These bats are particularly vulnerable due to many individuals using only a small number of communal roosts.

Chiricahua leopard frog (*Rana chiricahuensis*)

The Chiricahua leopard frog (*Rana chiricahuensis*) was proposed for listing as a threatened species without critical habitat in a Federal Register notice dated June 14, 2000. The rule included a proposed special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The frog is distinguished from other members of the *Rana pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 54 to 139 millimeters (mm) (2.1 to 5.4 inches (in)) (Stebbins 1985, Platz and Mecham 1979). The Ramsey Canyon leopard frog *(Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it often grows to a larger size and has a distinct call that is typically given under water (Platz 1993).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,000 to 2,710 meters (m) (3,281 to 8,890 feet (ft)) in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of currently extant populations in Arizona occupy stock tanks (Sredl and Saylor 1998).

Populations on the Mogollon Rim are disjunct from those in southeastern Arizona. Based on preliminary analysis of allozymes, the Rim populations may represent a taxon distinct from the southern populations (James Platz, Creighton University, pers. comm. 2000). However, mitochondrial DNA work at the University of Denver does not support this conclusion (N. Benedict, pers. comm. 1999). Additional work is needed to clarify the genetic relationship among Chiricahua leopard frog populations.

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Rana tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During extensive surveys from 1995-2000, primarily by Arizona Game and Fish Department personnel, Chiricahua leopard frogs were observed at 60 localities in Arizona (Sredl *et al.* 1997, Rosen *et al.* 1996, Service files). In New Mexico, the species was found at 41 sites from 1994 -1999; eight of 31 of those were verified extant during 1998-1999 (Painter 2000). During May-August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994-1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 75 percent of its historic localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Based on Painter (2000) and the latest information for Arizona, the species is still extant in all major drainages in Arizona and New Mexico where it occurred historically; however, it has not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, East Clear Creek, West Clear Creek, Silver Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, Sonoita Creek, Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter, pers. comm. 2000).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and destruction of habitat; water diversions and groundwater pumping; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Oronectes virilis* and possibly others), and several other species of fish (Fernandez and Rosen 1998, Rosen *et al.* 1996, 1994; Snyder *et al.* 1996; Fernandez and Bagnara 1995; Sredl and Howland 1994; Clarkson and Rorabaugh 1989). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al.* (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen *et al.* (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al.* 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations winked out due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. However, as numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers have disappeared.

Fire frequency and intensity in the mountain ranges of southeastern Arizona and southwestern New Mexico are much altered from historic conditions. Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al.* 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996). Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled in Rucker Lake, a historic Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) list six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western States), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, "western Africa", and Kenya), Mexico (Sonora), and United States (8 States) (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al.* 1998, S. Hale pers. comm. 2000). Ninety-four species of amphibians have been diagnosed as infected with the chytrid *Batrachochytrium dendrobatidis*. In Arizona, chytrid infections have been reported from four populations of Chiricahua leopard frogs (M. Sredl, pers. comm. 2000), as well as populations of Rio Grande leopard frog (*Rana berlandieri*), Plains leopard frog (*Rana blairi*), lowland leopard frog (*Rana yavapaiensis*), Tarahumara frog (*Rana tarahumarae*), canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Davidson *et al.* 2000, Sredl and Caldwell 2000, Morell 1999, S. Hale pers. comm. 2000). The disease was recently reported from a metapopulation of Chiricahua leopard frogs from New Mexico; that metapopulation may have been extirpated (C. Painter, pers. comm. 2000). The proximal cause of extinctions of two species Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely chytridiomycosis. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000).

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined; however, it may well prove to be an important contributing factor in observed population decline. Rapid death of recently metamorphosed frogs in stock tank populations of Chiricahua leopard frogs in New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. However in both cases, symptoms of moribund frogs matched those of chytridiomycosis. Chytrids were recently found in a specimen of Tarahumara frog collected during a die off in 1974 in Arizona. This earliest record for chytridiomycosis corresponds to the first observed mass die-offs of ranid frogs in Arizona.

The origin of the disease is unknown, but epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into naive populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger *et al.* 1998), including global climate change (Daszak 2000, Pounds and Crump 1994). If it is a new introduction, its rapid colonization could be attributable to humans. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and bullfrog in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000). Chytrids could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The Service and Arizona Game and Fish Department are employing preventative measures to ensure the disease is not spread by aquatic sampling.

Additional information about the Chiricahua leopard frog can be found in Sredl *et al.* (1997), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Platz and Mecham (1984, 1979), and Painter (2000).

III ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed project because impacts may be carried downstream with the flow and radiating channel adjustments, both upstream and downstream, are normal whenever stream channel are altered (Dunne and Leopold 1978). The action area for the proposed project is the entire Montana Allotment.

Because riparian zones often follow the gradual elevational changes of a watershed, they are often desirable for road and pipeline construction leading to greater impacts to riparian ecosystems. Native riparian ecosystems, especially in the arid Southwest, are disappearing rapidly. Riparian areas are widely recognized as crucial to the overall ecological health of rangelands in the western U.S.; however, many are in degraded condition, largely as a result of poorly managed livestock grazing (U.S. General Accounting Office 1988). Riparian areas, however, have ecological importance far beyond their relatively small acreage because they have a greater quantity and diversity of plant species than adjoining land. Riparian areas in arid and semiarid regions are composed of complex and edaphic and vegetation mosaics because of high variability in landforms, soil types, and location of surface and subsurface water. Livestock tend to congregate in riparian areas for extended periods, eat much of the vegetation, and trample streambanks, often eliminating other benefits of riparian habitat (e.g., fish and wildlife habitat, erosion control, floodwater dissipation).

The Montana Allotment is located in the Atascosa and Pajarito Mountains west of Nogales, Arizona in Santa Cruz, County and within the Nogales Ranger District of the Coronado National Forest (see appendix map 1.). Elevation ranges from 1067m (3,500 ft.) at the Mexican border to 1637m (5,376 ft.) at the summit of Montana Peak. The allotment covers 8730 ha (21,572 ac.). The allotment abuts with the Republic of Mexico on its extreme southern boundary.

The Montana Allotment includes lands within two major watersheds. Approximately forty-five percent of the total area is within the Arivaca Creek watershed (Chiminea and Bartolo Canyons). The remainder of the proposed action area is within the Rio Altar watershed (California Gulch, Holden Canyon, and Warsaw Canyon). California Gulch is the only mapped riparian area within the action area, and is a tributary to Los Aliso and thence Rio Altar in Sonora, Mexico. The total stream length of California Gulch is 9.6 km (6 mi) from the international border to its headwaters.

Arivaca Creek watershed is the uppermost watershed which consists of Chiminea Canyon, Bartolo Canyon, and Oro Blanco Wash. Rio Altar watershed is the southernmost watershed in Montana Allotment and consists of four drainages. Holden, Warsaw, and Old Glory Canyon are tributaries to California Gulch.

The Montana Allotment is classified as Management Areas 7, 1 and 4 in the Coronado National Forest Plan. Management Area 7 is classified as an area of undeveloped lands that has been identified as supporting floral and faunal associations that are unique enough to require special management practices, including identified riparian ecotypes and known essential habitats for threatened and endangered plants and animals. The capability area type, 11AR, is characterized by nearly level to gently sloping intermittent streams at elevations of about 1459 to 1707 m (4,800 to 5,600 ft). Dominant slopes are 0 to 5 percent. The climate is steppe (hot). Mean annual air temperatures ranges from about 13 to 17 C (56 to 64 degrees F). Mean annual precipitation ranges from about 30 to 56 cm (12 to 22 in.) which comes from gentle rains in winter and high intensity localized thunderstorms in summer (Coronado Forest Plan 1988). Capability area type 11AR is a riparian zone whose native vegetation includes Fremont cottonwood, Arizona sycamore, a few emory oak and Arizona walnut, wolfberry, and Texas mulberry and includes California Gulch from the border to the old Ruby townsite. Ash is a major decidous riparian tree species of the area and deergrass is an important herbaceous riparian species.

Management Area 1 is characterized by steep, rugged lands that may be very visible from major travel routes. These lands have generally been determined as incapable of or unsuitable for sustained wood harvest and livestock grazing. Slopes are generally greater than 40 percent. Management Area 1 includes all vegetative types except major riparian areas. The capability area type, 6H/M, is characterized by moderately sloping to steep hills and rough mountain slopes at elevations of about 1463 to 1920m (4,800 to 6.300 ft). Dominant slopes range from 25 to 40 percent. All of the Montana Allotment except California Gulch falls into capability area type 6H/M.

Management Area 4 is comprised of lands capable and suitable for fuelwood harvest, livestock grazing, and game habitat management. Management Area 4 includes desert scrub, grassland, chapparal, and woodland vegetative types. The capability area type, 1H/M, is characterized by moderately sloping to moderately steep hills and mountains at elevations of about 914 to 1554m (3,000 to 5,100 ft). Dominant slopes are 25 to 40 percent. This capability area type is found in two locations on the Montana Allotment: the extreme southwest corner and southeast corner of the allotment.

Prior to the creation of the Montana Allotment, historical records show that stocking rates were in the range of 500 to 1,000 plus head of cattle distributed throughout the allotment.
This area has been managed mainly for livestock grazing since the early 1900's. The Montana Allotment was created in 1935, at which time 731 cattle were permitted. By 1976, the permit was reduced to 500 cattle. Montana Allotment has been grazed for the last 24 years with a permitted use of 500 cattle. Livestock management was much different in these earlier days. Emphasis was on the uplands and there was very little concern for any riparian areas. In fact they were considered “sacrifice areas” in range management schemes. It was not until the 1970's that serious consideration was given to managing riparian areas. As a result serious damage to the stream channels and aquatic habitat occurred. However, since the change in grazing management in 1988, there has been improved management with rest/rotation grazing. This proposed action now further refines management with an emphasis on accelerated riparian improvement in lower California Gulch.

Management previous to 1987, was yearlong grazing with no rest and two large pastures, the California Gulch/Warsaw pasture and the Chiminea pasture. There was limited water development and poor distribution. Stocking rates were in the range of 500-700 with yearlong grazing. Since 1988, the allotment has been under improved management with rest/rotation grazing. This proposed action now further refines management with an emphasis on accelerated riparian improvement in lower California Gulch.

The Montana Allotment exhibits many aspects of degradation caused by livestock presence on the streambanks and livestock grazing in the riparian zone. Eroded banks and terraces stranded above the water table indicate that the stream bottom of California Gulch may have been about 5 ft higher historically. Erosion and sedimentation likely resulted from historic watershed degradation and from stream channel alterations due to roads, mining, grazing, and recreation activities. The width/depth ratio in Table 1 are a good indication that California Gulch is significantly altered from the expected natural dynamic equilibrium.

Historically, mining has occurred on the Montana Allotment with current mining claims still in use today. Currently, some active mining occurs on the Montana Allotment (USFS 1999), and potential water contamination from these operations could impact Sonora chub from water transporting metals (cadmium, copper, manganese, lead, and zinc) into California Gulch. These mining operations have contributed to the degraded watershed in the Montana Allotment. The USFS continues to receive requests for mining exploration permits. In addition, hydraulic mining and its associated road building activity has had adverse effects on the landscape as evidenced by historic mining activity. There is a large network of roads; approximately 92 km (57 mi) occur on the Montana Allotment that were built to facilitate past and current mining operations as well as gaining access to areas for future mine explorations. One main road that leads down into California Gulch crosses the stream in several places. A portion of this main road has recently been removed out of the channel bottom to reduce impact on riparian resources; however, impacts are still occurring. Due to past mining activity much of the riparian vegetation has been impacted by removal to facilitate road construction. Roads have contributed heavily to the overall degraded condition of the California Gulch stream channel.

Prior to 1988, range conditions on the Montana Allotment were described as poor. Reports and documents indicate vegetation condition was rated poor to fair. Low plant vigor with a high percent of annuals and bare ground was typical of upland vegetative conditions. A watershed condition analysis conducted by Jerry Conner and Robert Lefevre in 1990 indicated vegetative ground cover was lacking and the watershed was in unsatisfactory condition. The General Ecosystem Survey (GES) indicated that soil condition on the allotment was 67 percent satisfactory, 23 percent impaired, and 10 percent unsatisfactory. The AMP included livestock forage rates which complied with the 1987 Forest Plan of 35 to 55 percent with an average of 40-45 percent utilization. These were based on research conducted by Clark Martin and others on the Santa Rita Experimental Range. These utilization guidelines were to provide average perennial grass utilization on key areas for the Montana Allotment. Utilization rates were changed in 1997 to 35 percent during the growing season and 45 percent during the nongrowing season. However, this utilization level does not comply with the current Forest Plan (1986). During 1997 and 1998, vegetation and soil data were collected on the Montana Allotment which indicated some improvement in watershed conditions (see table 1).

The following table provides the most current data on the conditions for California Gulch and Arivaca Lake watersheds.

Table 1

	California Gulch	**Arivaca Lake**	**Total (entire allotment)**
Soils Quality	percent	percent	percent
Satisfactory	73	80	77
Impaired	24	18	21
Unsatisfactory	1	1	1
Unsuited	1	0	1
Sediment Yield			

Total erosion in tons/acre/year	1.63	1.17	1.39
Channel condition* **			**Expected for "C4" channel according to Rosgen**
Bottom sediments	20% sand and silt, 80% gravel	50% sand and silt, 21% gravel, 29% cobbles and boulders	20% sand and silt, 50% gravel, 30% cobbles and boulders
width:depth ratio	71.9	86.7	20 to30
entrenchment ratio	1.5	1.5	2 to 10
overall channel slope	2.8%	1.9%	N/A
			Expected from Forest Vegetation Map
Percent vegetation criteria from LMP met in the riparian zones **	55%	0%	California Gulch: 70% and Chiminea: 0%
Roads (Total Miles)	45.3	10.9	56.2
Miles/square mile	2.45	0.56	1.48
Acres	65.89	15.85	81.75
Vegetation	Percent	Percent	Percent
Sonoran Desertscrub	7%	0%	4%
Desert Grassland	0%	33%	16%
Broadleaf Woodlands	91%	64%	79%
Deciduous Riparian*	2%	2%	2%

*** current channel conditions for both watersheds are compared to potential conditions according to Rosgen's stream classification (Rosgen 1996).

** this depicts current percentage of vegetation compared to potential vegetation according to Forest vegetation map.

* All the deciduous riparian vegetation mapped in the Arivaca Lake watershed is around Arivaca Lake and downstream from the dam. None of it is upstream from the lake. This is only existing obligate riparian vegetation and excludes areas where riparian vegetation has been lost and could be removed.

Current conditions of the upland vegetation on the Montana Allotment are fair to good and are expected to continue to improve at rates recently observed. Based on data collected by the USFS from 1983 to 1998, conditions in riparian areas on the Montana Allotment are improving, however, 44 percent of the parameters observed are still unsatisfactory. The unsatisfactory rating was primarily assigned because of the lack of multistoried stands, especially mature tree overstory. Overall allotment conditions have improved under current grazing management but, that grazing management also has affected the rate and degree of improvement to which upland and riparian condition could recover. Soil conditions are satisfactory on 80 percent of the allotment, impaired on 18 percent, and unsatisfactory on only 2 percent. Problem areas in vegetation and soil conditions are occurring on the west half of Ruby Pasture, the Bill Ewing area and around Mujeres Tank. Water and air quality on the allotment is satisfactory.

Montana Allotment is located in fairly remote and rugged country and not easily accessible. There is a small amount of recreational activity but it is light to moderate, in the form of hunting, that occurs during the fall. This impact is minor but does contribute to watershed degradation in the form of contributing sedimentation to California Gulch and trampling riparian vegetation from driving off designated roads and driving in and across the stream channel, and camping in the riparian zone.

The following table lists all past Formal and Informal Consultations and on-going informals that were done on Sonora chub and/or lesser long-nosed bat in the past in nearby project areas.

Table 2.

Project	**Date of Opinion**	**Species**	**Finding**
On-Going Livestock Grazing Activities on various allotments on Coronado NF	**February 2, 1999**	**Sonora chub and Lesser long-nosed bat**	**Non-jeopardy Biological Opinion**
Coronado National Forest Plan	**December 6, 1985**	**Sonora chub**	**Non-jeopardy Biological Opinion**

U.S. Border Patrol Tucson Sector	**ongoing**	**Lesser long-nosed bat**	
California Gulch Access	**April, 28, 1997**	**Sonora chub**	**Not likely to adversely affect Concurrence**

Status of the Species (within the action area)
Sonora chub

In the Montana Allotment, there are 6.4 km (4.0 mi) of potential Sonora chub habitat in California Gulch from the International border upstream to the Apache Dam. The lower 3.2 km (2.0 mi) between the International border and the Tinaja dam has perennial or near perennial water and is occupied year round by Sonora chub when water conditions are appropriate. The Tinaja dam serves as a barrier to the movement of Sonora chub upstream. Therefore, the upper two miles of suitable habitat are not currently occupied. Within the lower 3.2 km (2.0 mi) of occupied habitat, there are two exclosures (one adjacent to the International border and one at the Tinja dam) which consist of about 0.4 km (0.25 mi) of stream. The remainder of the 2.8 km (1.75 mi) between these two exclosures is subject to livestock grazing. Under the exisiting management, up to 500 livestock can have access to the reaches of California Gulch occupied by Sonora chub. These livestock can have direct contact with the Sonora chub. during the most critical periods of breeding and reproduction. Sonora chub is the only native fish in California Gulch.

Even with the very dry conditions that have existed in California Gulch and have caused the U.S. portion of Califomia Gulch to dry up, Sonora chub have remained extant. However, the viability of the population of Sonora chub is limited by conditions that restrict formation of habitat that can sustain Sonora chubs for longer than a few months. Survival habitat during dry periods for Sonora chub in California Gulch is likely in Mexico and perhaps in a single, small pool at the site known as the “tinaja” which was excluded from livestock in 1998.

The amount of available water in California Gulch depends on the local precipitation which consists of both long and short periods. Annual precipitation at the Ruby townsite during 1931 to 1955 was about 48 cm (19 in) with extremes between 25.4 -86 cm (10 and 34 in). California Gulch has a typical southwestern climatic regime with a biseasonal pattem of winter precipitation, spring aridity, summer monsoons, and fall aridity (Sellers et al. 1985). During wet periods surface water can be continual throughout California Gulch, and then dry to isolated pools during more arid periods. Persistence of individual pools is determined by long-term events. In California Gulch most pools are formed in gravel-cobble substrate at bedrock outcrops, either along valley walls at scour points, or at bedrock dikes across the valley bottom that develop plunge pools. Surface area and volume of pools is dependent on the immediate channel morphology, depth to bedrock, sediment processing, and dynamics of the flood event causing scouring. Many pools in California Gulch are ephemeral in time and space depending on movement and deposition of bedload during flooding, and precipitation. In the United States, there is only one pool that has not dried up during the past few years, a large pool located at the tinaja exclosure, which is probably the source for chubs for recolonization post-drought.

The population of Sonora chub responds to these wet and dry cycles by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. On an individual basis, a substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survived the dry period. The species has an amazing capacity for reproduction and recruitment as its habitat expands; it can seemingly explode from a small number of individuals occupying a few pools to a population numbering in the thousands and occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of California Gulch, which has allowed the Sonora chub to survive until present (Bell 1984).

Surveys were conducted in March of 1995, in California Gulch, Warsaw Canyon, Holden Canyon, Bonita Canyon, and Alamo Wash on the United States side of the border by the Arizona Game and Fish Department. Prior to this survey there were no records of native fish from these drainages within the United States because no formal surveys had been done. Nonnative mosquitofish and green sunfish were the only fish species previously known from California Gulch.

During the 1995 surveys, nonnatives were not found in the half mile reach immediately above the international border however; Sonora chub were abundant. Mosquitofish and black bullhead were common upstream of this reach, and green sunfish and bluegill were uncommon. Nonnative bullfrog tadpoles and adults were common throughout California Gulch. A single goldfish was observed in Warsaw Canyon. No fish were found in Holden Canyon, Bonita Canyon, or Alamo Wash.

In 1995, the Arizona Game and Fish Department first observed four Sonora chub in pools next to the bedrock downstream of Warsaw Canyon confluence. A total of six Sonora chub were collected between the tinaja dam and the confluence with Warsaw Canyon. From the international border upstream to the road and confluence with Schumaker Spring Canyon, 583 Sonora chub were recorded during 1995.

During the 1995 survey in California Gulch, Sonora chub were found ranging from just below the tinaja immediately above the confluence with Warsaw Canyon downstream to the International Border with Mexico. Sonora chub were abundant in approximately one-half mile of stream from the international border upstream to the four-wheel drive road. In this reach Sonora chub were found in various types of habitat including pools, riffles, and runs, and represented a variety of size classes ranging from 23 to 141 mm (.90 to 5.5 in) total length (n=17) 17 individuals sampled. Sonora chub were present, but uncommon in approximately 2.4 km (1.5

mi) from the four-wheel drive road upstream to the concrete dam. In this reach Sonora chub were only found in the deepest pools at the base of bedrock cliff faces and large boulders. These fish appeared to be of the same size classes ranging from 73 to 87 mm (2.8 to 3.4 in) total length (n=10) 10 individuals sampled. Sonora chub were not observed upstream of the Tinaja dam.

Since the discovery of Sonora chub in California Gulch in 1995, Arizona Game and Fish Department and the U. S. Forest Service have conducted surveys to monitor their abundance and current habitat. The area surveyed extended from the international border upstream to the "tinaja" dam a total stream length of 3.2 km (2 mi). The surveyed area includes two livestock exclosures, one at the border extending 1/4 of a mile upstream and the other at the tinaja dam, about 113 m (370 ft) long. Surveys occurred in every season throughout the year. In this 5 year period, Sonora chub were observed in every survey except June 2000 (USFS 2000).

The last year Arizona Game and Fish Department surveyed California Gulch for Sonora chub was in 1997, in which 123 Sonora chub were recorded with no young of the year (YOY) found and the existing population looked stressed (AGFD 1997). From December 1998 to October 2000, the Coronado National Forest staff did ocular surveys only and no real numbers of population size were taken; however, young-of-the-year (YOY) and adults were observed (USFS 2000).

From July through October of 2000, the Coronado National Forest surveyed California Gulch from the border exclosure to the Tinaja exclosure. The purpose of these surveys was to document presence/absence of surface water and Sonora chub during the period that livestock were in Schumaker pasture (mid-July to mid-October) on the Montana Allotment. California Gulch was surveyed seven times during this period. Sonora chub and other fish were present throughout the surveyed reach during much of the summer (see maps 3a-g). As surface flow waxed and waned during August, Sonora chub exploited higher flow periods by spawning and colonizing newly-wetted habitats. Both adults and young-of-year (YOY) were observed using the habitat between the two exclosures, which indicates either that adult chubs were present and had reproduced in these pools, or that small chubs had colonized the reach during the few times that flow connected the channel between the two exclosures. Within the border exclosure, (YOY) chubs were present at the end of July, and it appeared that a second spawn occurred during August. No reproduction of chubs was noted at the Tinaja, but the predators there could have consumed any small chubs (USFS 2000).

These surveys constitute about 18 percent of the entire range (including Sycamore Canyon) where Sonora chub are found in the U.S. The only other population of Sonora chub in the U.S. exists in Sycamore Canyon.

The proportion of unaffected versus affected habitat by livestock use in California Gulch is very small; in the lower 3.2 km (2 mi) of California Gulch, the two existing exclosures in this reach of stream provide habitat protection on about 0.40 km(0.25 mi). The remaining 2.8 km (1.75 mi) is open to livestock grazing. Sonora chub have been observed using the entire 3.2 km (2.0 mi) for spawning and recruitment. These exclosures have been in place since 1998. However, the problem of livestock trespassing from Mexico in the past and the continuing upstream impacts from livestock grazing contribute to overall Sonora chub habitat degradation. Livestock trespass from Mexico has been a problem throughout the past 10 year permit. The Coronado National Forest just recently installed an impenetrable fence at the international border to alleviate this livestock trespass.

Predation by nonnative vertebrates is also a threat to populations of Sonora chub. Green sunfish is a known predator on native fishes in Arizona (Minckley 1973), and has been implicated in population changes in other lotic fish communities(AGFD 1988) as well as bullfrogs. A private reservoir with nonnative fish species is located just upstream of where Sonora chub currently exists in California Gulch, and it is likely that the nonnatives in lower California Gulch came from this upstream reservoir. In addition, there are several reservoirs and instream pools (Apache dams, Ruby Lakes, reservoirs at Ruby) in California Gulch that contain nonnatives, and some of them are on national forest land.

Lesser long-nosed bat

Lesser long-nosed bats require forage plants (paniculate agaves and saguaros) and suitable roost sites. Because the area has not been adequately surveyed, it is unknown at this time whether the bat actually roosts within or adjacent to the Montana Allotment. Mines and caves occurring throughout the allotment could potentially provide suitable roost sites. Any potential roosts in the area would probably be late summer post-maternity roosts used by adults and/or young bats in summer or fall. Agaves, and to a lesser extent saguaros, occur in considerable numbers throughout much of the allotment. The closest known lesser long-nosed bat roost site is approximately 64 km (40 mi) away located in the Patagonia mountains.

Based on known distances lesser long-nosed bats have traveled from roost sites to foraging areas, potential foraging habitat may extend in a 64 km (40 mi) radius from roosts. Because potential roost sites exist on the allotment and forage plants are abundant, the Montana Allotment is considered lesser long-nosed bat foraging habitat. There are a number of mine shafts and adits, in addition to natural caves and rock crevices on the Montana allotment or within the flight range of these bats that have not been surveyed. There is a lack of information on the degree to which livestock grazing affects agave flower production, reproduction, or agave seedling establishment. Currently, there is a forest-wide study to determine the effects of livestock grazing on agaves.

Chiricahua leopard frog

The Pajarito/Atascosa Mountains, in which the proposed action would occur, is an important area for the Chiricahua leopard frog. The Service is aware of 17 historic localities for the species in this mountain range complex. On the Montana allotment occurrence of the Chiricahua leopard frog is uncertain, however historic localities exist at California Gulch (most recent sighting 1995), Warsaw Spring (1994), Japanese Tank (1992), and Holden Canyon (1995). Recent surveys suggest the species is likely absent from California Gulch, Warsaw Spring, and Japanese Tank. The status of the population in Holden Canyon is unknown. The species occurs at several localities on the Bear Valley allotment just east of the Montana allotment. The population in Sycamore Canyon on the Bear Valley allotment is probably a source of immigrants to other areas, including the western portion of the Montana allotment. It is likely that Chiricahua leopard frogs wander from the Bear Valley allotment into the tanks and other aquatic sites on the western edge of the Montana allotment.   Many tanks occur on the Montana allotment that are difficult to access. Some of these, particularly in the southern portions of the allotment, may contain populations of Chiricahua leopard frogs. No extant populations of Chiricahua leopard frogs are known immediately north or west of the Montana allotment. The status of populations to the south of the allotment in Sonora is unknown.

Mining activities occur in California Gulch in the allotment. Heavy metal contamination associated with airborne pollutants from copper smelters may have been a factor in the extirpation of the Tarahumara frog from Arizona and some sites in northern Sonora and decline of Chiricahua leopard frog populations in Arizona (Hale *et al.* 1995) (however, see discussion above in regard to chytridiomycosis). Slightly acidic rainfall may have mobilized cadmium and/or arsenic from mine tailings or naturally-occurring sources creating toxic conditions in streams (Hale and Jarchow 1988). However, the effects of mining activity in California Gulch on the Chiricahua leopard frog and its habitat are unknown.

Information about vegetation communities, range condition and trend, and other descriptions of the allotment can be found in the biological assessment/evaluation and in the environmental baseline for the Sonora chub.

IV EFFECTS OF THE ACTION
Direct and Indirect Effects on Sonora chub

The Montana Allotment encompasses 8730 ha (21,578 ac) with four designated pastures, Chiminea, Ruby, Warsaw, and Schumaker. The shipping pasture, Ruby Trap, is only used for a period of two weeks which acts as a holding area prior to cattle being shipped out. The three main riparian areas in the Montana Allotment include, California Gulch, Warsaw Canyon, and Chimney Canyon with the rest of the allotment consisting of uplands. The only mapped riparian area is California Gulch. The largest riparian area on the Montana Allotment is California Gulch, and it is also the only area where Sonora chub are found. Livestock have the most immediate effect on Sonora chub when they are grazing the Schumaker pasture, California Gulch is located in the Schumaker pasture and the proposed riparian pasture. California Gulch is 4795 ac (11,849 ac) in size.

Impacts from livestock grazing in Warsaw Canyon riparian area are not as severe as the impacts from livestock grazing in California Gulch, however they could have some indirect effects to the riparian area of lower California Gulch where Sonora chub exist because Warsaw Canyon is a tributary within the California Gulch watershed. The effects of livestock grazing on fish and fish habitat have been well documented (Kaufman and Krueger 1984; U.S. General Accounting Office 1988; Platts 1990, 1991; Fleischner 1994; Waters 1995, Trimbel and Mendel 1995; Belsky et al. 1999).

The effects to the Sonora chub and its habitat in California Gulch from the proposed livestock grazing would be through watershed degradation, changes in channel geomorphology, (through alteration of streambanks, stream channels, and water column), alteration of the riparian vegetation community, and alteration of the faunal community. Under the proposed action, up to 10 percent of the 500 currently permitted livestock (50 cows) would be allowed to graze for three months from mid July to mid October until 30 percent utilization on apical meristems or 14 inch stubble height of deergrass is reached in the proposed 700-acre riparian pasture in Schumaker pasture. Thus, there will be direct and indirect effects from livestock grazing on the entire 3.2 km (2.0 mi) of California Gulch between the border fence and the tinaja exclosure which contains suitable habitat and is intermittently occupied by Sonora chub.

Watershed degradation- Livestock grazing may cause long-term changes to the watershed and its functions. The extent of these changes varies with watershed characteristics, grazing history, and cumulative effects from other human uses and natural watershed processes. Damage caused by cattle to riparian and stream habitats in the arid and semiarid West can be separated into two broad catagories: impacts that occur at the local level and those that occur at the landscape and regional levels. Local impacts can be further segregated by their effects on water quality and seasonal quantity, stream channel morphology, hydrology, riparian-zone soils, instream and streambank vegetation, aquatic biota, and terrestrial wildlife. Local impacts have been investigated in a large number of studies, but landscape level impacts have received less attention. Despite this, the relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Leopold 1946; Blackburn, 1984: Skovlin, 1984; Chaney et al. 1990; Platts, 1990; Bahre, 1991; Meehan, 1991; Fleischner, 1994, Myers and Swanson, 1995; Satterlund, 1972; Hadley, 1974; Cooke and Reeves, 1976; Sheridan, 1981; Graf, 1985, 1988).

Cryptobiotic crusts, consisting of lichens, fungi, algae, mosses, and cyanobacteria are important soil stabilizers of desert soils (Belnap 1992). These crusts decrease wind erosion and have a significant effect on soil stability and rates of water infiltration (Belnap and Gardner 1993). Cyanobacterial soil crusts have been shown to increase soil retention through absorbency of the polysaccharide sheath material that surrounds groups of living filaments. These crusts also act to increase the availability of many nutrients in sandy soils (Belnap 1992; Belnap and Gardner 1993).

Disturbance of soils, including cryptobiotic crusts, and removal of vegetation by grazing combine to increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). Loss of vegetation cover and trampling of soils promote further deterioration of soil structure, which in turn accelerates vegetation loss

(Belsky and Blumenthal 1997). These changes tend to increase peak flows in drainages (DeBano and Schmidt 1989), making water courses more "flashy", which promotes erosion, downcutting, and loss of riparian and xero-riparian vegetation (Belsky et al. 1999).

Although watershed effects vary depending upon the number and type of livestock, the length and season of use, and the type of grazing management, the mechanisms remain the same and the effects vary only in the extent of area and severity (Blackburn, 1984; Johnson, 1992). Most landscapes are composed of mostly upland slopes and it is here that cattle have perhaps collectively their greatest effects. They directly reshape the earth, compact the soil and cause increased runoff, sometimes transforming the runoff regime from variable source area to saturated (Hortonian) overland flow. They further weaken biological resistance and trample and loosen soil, changing its susceptibility to both water and wind erosion.

The direct force of cattle hooves reshapes the land. The most common manifestation of direct force is the path or trail. Although cows tend to range widely on a daily basis, they do use the same path enough to create trails. Because the trails are less permeable (from compaction and crusting: Rostagno 1989) and because they conduct water, they may erode to larger proportions (Hole, 1981) even under "light" grazing (Naeth et al., 1990), and direct water and/or sediment cascades onto other, perhaps more vulnerable areas, themselves often created by the cow (Kaufman et al. 1983 a,b). Compaction is a strong direct effect of force which leads to the direct effect of reduced infiltration and the resulting force of increased overland flow, which in turn leads to increased erosion. Another soil characteristic that is affected by cattle grazing is the bulk density. For example, the combination of grazing and trampling will usually reduce the density of grass cover (e.g. Hofmann and Ries, 1991). Among other effects, severe compaction often reduces the availability of water and air to the roots, sometimes reducing plant vitality (e.g., Reed and Peterson, 1961). Grass species change from perennial to annual and from deep-rooted to shallow-rooted (Naeth et al., 1990). Removal of phytomass by grazing and lessened phytomass production can reduce fertility and organic matter content of the soil. Soil aggregate stability is decreased and the surface sometimes becomes crusted. Proportion of bare soil appears to correlate well with surface run-off and sediment yield (Lusby, 1970; Thurow et al., 1986; Warren et al., 1986a; Takar et al., 1990).

Lusby (1970), working in western Colorado, found that runoff from a grazed watershed was 30 percent greater than that from an ungrazed watershed. The latter had previously been grazed (at the same intensity as the grazed watershed), but immediately showed signs of recovery including reduced runoff. Within 3 years, the difference in runoff between the two watersheds was significant. Rauzi and Smith (1973) report that infiltration rates varied with grazing intensities on pastures in northeastern Colorado. Under "light" to "moderate" grazing, infiltration rates were 5.6 and 5.9 cm h-1 (80.0 to 84.3 cf/ac), respectively, of which about 30 percent of the total water infiltrated within the first 15 minutes. Under "heavy" grazing, the infiltration rate was 4.8 cm h-1 (68.5 cf/ac), and 44 percent of the total water was infiltrated within the first 15 minutes. Usman (1994) also found that infiltration rates decreased substantially under "moderate" and "heavy" grazing and he attributed these reductions to changes in soil structures. These authors conclude that "moderate/light" grazing reduces infiltration capacity to about 3/4 of the ungrazed condition; "heavy" grazing reduces infiltration capacity to about 2/3 of the "moderate/light" condition or ½ of the ungrazed condition (Gifford and Hawkins, 1978).

One of the biological factors that is often neglected in analyzing the effects from livestock grazing is fauna, in particular soil fauna. Soil fauna (endopedofauna) generally have positive effects on the hydraulic conductivity of soil by   (1) increasing porosity and permeability, (2) improving soil structure, and (3) increasing fertility. It appears that soil fauna ranging from earthworms to moles have more difficulty surviving in the impacted soil conditions resulting from heavy grazing (Hole, 1981; Abbot et al., 1979).

Watershed condition is based on percent of ground cover with effective cover present. Effective ground cover is rock, plants, or plant material that is capable of continously intercepting falling rain drops and dissipating their potential erosive energy before they encounter bare soil. Watershed ratings are relative to a predetermined percentage of effective ground cover at various monitoring sites. The percentage of effective ground cover considered acceptable is a value representative of the quantity of ground cover required to prevent excess erosion, based on forest-wide capability area groups. The ratings are: unsatisfactory, for a lower percentage of effective ground cover than is needed to prevent excess erosion, and satisfactory, for percentages in excess of the needs for a given site. Trend in watershed condition is a descriptive term used to identify increase (up), decrease (down), or no apparent direction (static), since the last range analysis (1966). Soils on about 80 percent of the allotment are rated as satisfactory, but in general slopes less than 15 percent are impaired or unsatisfactory. A large area (Bill Ewing and Mujeres Tank areas) that borders California Gulch from nearby Ruby Lakes downstream to below Apache Dams is considered impaired. Although percentage of plant cover appears to be increasing with little evidence of erosion caused by livestock on the uplands, a reduction in grazing pressure and fencing of the Bill Ewing and Mujeres Tank areas should help to enhance soil conditions in these areas. The major concern is the concentrated use by livestock in the flatter slopes, where soil conditions are impaired or unsatisfactory. These areas are close in proximity to stream channels where potential for erosion during flooding could be greatly increased by the impaired and unsatisfactory soils conditions. In addition, these soil conditions have retarded the capability to filter sediment from uplands during runoff, and reduce water retention abilities.

The proposed utilization rate of 45 percent is at or exceeds the maximum recommended in the literature for local conditions (Holecheck et al., 1998, 1999) and may retard recovery of upland vegetation conditions. Stocking rates that result in 35 to 45 percent utilization are recommended for semiarid grassland ranges in general (Holecheck et al. 1998). Long-term experiments at the Santa Rita Experimental Range indicated that a 40 percent use level should be used when assigning stocking rates (Holecheck et al. 1999).

Riparian Areas **-** As with watershed effects, livestock grazing has indirect effects on Sonora chub and its habitat through altering streambanks, channels, and riparian vegetation which will vary depending upon the number and type of livestock, the length and season of use, and the type of grazing management; however, the mechanisms remain the same and the effects vary only in extent of area and severity (Kinch, 1989; Valentine, 1990; Platts, 1990; Elmore, 1992; Chaney et al., 1993). However, linking the effects of livestock grazing on aquatic habitat to health and vigor of southwestern fishes can be problematical. Most of our knowledge of grazing-fisheries interactions has been gained from investigations on salmonid species in more mesic habitats, and the direct applicability of this knowledge to southwestern warmwater fishes remain largely unexplored (Rinne 1999). But the ecological principles that link grazing to changes in fisheries habitat via alteration of riparian and upland conditions are valid and can be applied.

Cattle presence on streambanks destabilizes streambanks through chiseling, sloughing, compaction, and collapse and results in wider and shallower stream channels (Armour, 1977; Platts and Nelson, 1985b; Platts, 1990; Meehan, 1991). This causes progressive adjustments in other variables of hydraulic geometry and results in changes to the configuration of pools, riffles, runs, and backwaters; levels of fine sediments and substrate embeddedness; availability of instream cover; and other fish habitat factors (Bovee, 1982; Rosgen, 1994). It also changes the way in which flood flows interact with the stream channel and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation. These impacts occur at all levels of cattle presence, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik, 1985). Damage begins to occur almost immediately upon entry of the cattle onto the streambanks and use of riparian zones may be highest immediately following entry of cattle into a pasture (Goodman et al., 1989; Platts and Nelson, 1985a). Vegetation and streambank recovery from long rest periods may be lost within a short period following grazing reentry (Duff, 1979). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being more vulnerable to damage (Marlow and Pogacnik, 1985; Platts, 1990). Cattle presence on streambank retards rehabilitation of previous damage as well as causing additional alteration (Platts and Nelson, 1985a).

Cattle grazing in and on riparian vegetation may cause change in the structure, function, and composition of the riparian community (Szaro and Pase, 1983; Warren and Anderson, 1987; Platts, 1990; Schulz and Leininger, 1990; Schulz and Leininger, 1991; Stromberg, 1993). Species diversity and structural diversity may be substantially reduced and nonnative species may be introduced through cattle feces. Reduction in riparian vegetation quantity and health and shifts from deep rooted to shallow rooted vegetation contribute to bank destabilization and collapse and production of fine sediment (Meehan, 1991). Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Karr and Schlosser, 1977; Platts and Nelson, 1989). Litter is reduced by trampling and churning into the soil thus reducing cover for soil, plants and wildlife (Schulz and Leininger, 1990). The capacity of the riparian vegetation to filter sediment and pollutants to prevent their entry into the river and to build streambanks is reduced (Lowrance et al., 1984; Elmore, 1992). Channel erosion in the form of downcutting or lateral expansion may result (Heede et al., USBLM, 1990).

Physical damage to streambanks and channels in conjunction with loss or reduction of riparian vegetation may change the timing and magnitude of streamflow (Stabler, 1985; Meehan, 1991). Flood flows may increase in volume and decrease in duration and low flows may decrease in volume and increase in duration. Cattle trampling and grazing of the riparian corridor makes banks and vegetation more susceptible to severe damage during catastrophic flooding (Platts et al., 1985).

Increases in streambank erosion and water table decline will ultimately affect the existing riparian vegetation. A good example of this is the difference in habitat above the tinaja exclosure and the degraded habitat below the tinaja exclosure. The tinaja exclosure extends from the pool downstream from the rock "bathtub" and continues upstream to the small concrete dam at the upstream end of the exclosure. Sonora chub have been seen throughout the tinaja from the dam downstream to the pool below the rock "bathtub". Above the tinaja dam the floodplain is much more developed and subject to less livestock impact resulting in a smaller stream entrenchment ratio and less streambank chiseling therefore, providing a higher water table which provides the necessary soil moisture for riparian vegetation to grow completely to the stream's bank edges. Even though this area does receive some streambank alteration during each grazing season it still provides a good representation of existing suitable Sonora chub habitat. Without livestock impact, this reach would probably have a much different appearance than at present and would likely benefit Sonora chub. The Tinaja dam acts as a barrier to the ability of Sonora chub to move upstream. Sonora chub, however, exist below the Tinaja dam in a well developed pool. The habitat just below the Tinaja exclosure is accessed by livestock and the existing occupied habitat is severely degraded. The stream channel is wide and shallow, streambanks are sloughed off, water quality is poor, and indications of terracing of banks is evident.

The impacts of grazing on local riparian and stream environments and on stream morphology may be acute, but they also often extend beyond their immediate surroundings. Streams connect uplands to lowlands, terrestrial ecosystems to aquatic, and arid ecosystems to moist ecosystems (Gregory et al., 1991; Knopf and Samson, 1994). They act as corridors for migrating animals, provide moisture for aquatic, riparian, and upland species, and distribute sediments and nutrients downstream (Thomas et al., 1979; Lee et al., 1989).

Effects in the Chiminea Pasture

Chiminea is the northern pasture in the Montana Allotment. It is the largest pasture in the Montana Allotment consisting of 3,173 ha (7,841ac) with the local topography ranging in elevation from 1,280 to 1,524 m (4,200 to 5,000 ft). Cattle graze the Chiminea pasture as a winter pasture for six months from November 1 to April 30. Under the proposed grazing management, the number of cattle that will graze this pasture can vary from 350 to 500 cattle in any age combination. The Coronado proposes to monitor all their pastures on an annual basis as well as establish a 5-year baseline monitoring plan implementing site specific key areas to assess utilization and range condition. Season of use is restricted to the dormant season for woody vegetation. Effects to Sonora chub from the proposed action should be minimal in the Chiminea pasture, as it is in the Arivaca Creek watershed and drains to the north away from California Gulch.

Effects in the Ruby Pasture

The Ruby pasture is the next largest pasture in the Montana Allotment. It is 2,354 ha (5,818 ac) with the headwaters of the California Gulch located within its boundaries. Two large areas of major concern, Bill Ewing and Mujeres Tank, which border California Gulch near Ruby Lakes downstream to Apache dams are severely degraded. The percentage of plant cover in the form of perennial grasses appears to be increasing, and there is little evidence of accelerated erosion caused by livestock (USFS 1998b, 1999c, 1999d). The Coronado National Forest proposes to fence both of these areas from livestock grazing, which should enhance the soil conditions. Areas of additional concern are the flatter slopes that receive concentrated livestock use and where the soils are unsatisfactory or impaired. In turn, these conditions have only contributed to the current conditions of increased upland runoffs, reduced filtration of sediment, and reduced water retention abilities. Adhering to a strict grazing prescription and the required monitoring should only help to move towards improvement of the soil conditions.

The proposed grazing cycle is scheduled so that when the livestock have completed the rotation of either Schumaker or Warsaw pasture, the livestock will have to be moved through the Ruby pasture on their way to the Ruby trap. There is concern that once the livestock are in the Ruby trap for the required two weeks, it may be decided that livestock will be authorized to be moved out of the Ruby Trap early, and moved into Chiminea pasture before the designated date of use (Nov. 1). This kind of decision would create additional and prolonged impacts to the uplands in Chiminea pasture. In addition, suitable but unoccupied Sonora chub habitat exists in the very southern end of Ruby Pasture.

Effects in the Schumaker and proposed Riparian Pasture

The Coronado National Forest proposes to graze the Schumaker pasture from mid-July to mid-October every other year. The Coronado National Forest also proposes to allow 50 cows or ten percent of the base herd to graze three months in the proposed riparian pasture until utilization level of 30 percent on the apical meristems and/or a 14 inch stubble height on deergrass is reached. Once this utilization level is reached, livestock will be removed. The proposed 283 ha (700 ac) riparian pasture falls within the existing Schumaker pasture which encompasses about 8.0 km (5.0 mi) of California Gulch and includes 0.40 km (0.25 mi) of exclosures at the border in the far southwest corner of the pasture and the tinaja. Schumaker pasture is 1054 ha (2,605 ac). The majority of California Gulch is within the proposed riparian pasture, however, existing populations of Sonora chub are located only within the lower 3.2 km (2 mi) of California Gulch below the Tinaja dam. There are four parcels of private land within this area as well, three of these parcels are in very close proximity to the stream, and the fourth is located a little further on the uplands.

The current riparian conditions are unsatisfactory but with an upward trend (USFS 1999c). The Coronado National Forest's recent analysis indicates that stream morphology and vegetation in California Gulch is functional-at-risk and impaired (USFS 1999e) which adversely affects the Sonora chub by impairing reproduction and foraging. The Coronado National Forest proposes to implement two riparian monitoring sites within the riparian pasture; one at the northern boundary and one at the southern boundary.

Riparian utilization limits of 30 percent were developed for the riparian pasture in Schumaker pasture in order to enhance or reestablish the proper functioning condition of the riparian area (USFS 1999c). However, all monitoring and inventories that have been done on riparian areas show less than satisfactory condition due to the lack of mature trees. Continued use of streambanks at this level will likely result in increased degraded riparian condition and is unlikely to allow an upward trend in aquatic conditions (which requires a greater reduction of impact and a much longer recovery period). Larval and juvenile Sonora chub have been detected in California Gulch during spring, summer, and fall, indicating that adults can be present and spawning and recruitment is occurring during that time. Under previous management, livestock have had direct access to the same habitats used by the fish for spawning, feeding, growth, cover, and other aspects of their life histories. The proposed action will allow 50 livestock to graze up to three months every other year in recorded active spawning areas in the 1.75 miles of suitable habitat between the Tinaja and International border exclosures.

Livestock will directly impact all the habitats used by Sonora chub in California Gulch, except for those short reaches within the border and tinaja exclosures that are protected by fencing 0.40 km (0.25 mi). The international border exclosure was regularly trespassed by Mexican livestock prior to fence reconstruction. Consistent monitoring of this fence is mandatory to ensure trespass is not occurring. Habitat between those exclosures that is used for spawning and recruitment by Sonora chub, and unoccupied potential habitat between Apache Dams and the tinaja above the tinaja exclosure, will be grazed during the spawning season. When water conditions are adequate for fish to be present, direct impact to eggs, larvae, and juveniles of Sonora chub from trampling or ingestion can be expected. Spawning substrates will be disrupted. Aquatic habitats associated with streambanks will be degraded from hoof action and removal of vegetative cover. Algae, submergent, and emergent vegetation growing in stream margins and other shallow water areas will be trampled, and substrates will be churned by feeding and watering livestock, thus decreasing utility of those habitats for food production, larval and juvenile development, and cover.

As flows diminish, livestock will concentrate at pools and cause them to become shallower through trampling of the edges, become warmer through removal of shade and increased surface area exposed to direct sunlight, become more nutrient enriched through input of waste products from livestock, and become smaller through consumption of water by livestock. The presence of livestock in the stream channel may reduce the persistence of surface water and connectivity of habitats in the stream, adversely influence the formation of deep pool habitat through destabilization and erosion of streambanks and substrate materials, and restrict recruitment and growth of riparian vegetation needed for streambank building, cover, shade, and macroinvertebrate production. Warmer water temperatures may increase impact of any parasites or diseases in the population. These effects on habitat may reduce the capability of the stream to support a viable and self-sustaining population of Sonora chub in the United States.

Although the proposed riparian pasture and the reduced number of cattle that will be allowed in the pasture will reduce adverse impacts from livestock grazing on Sonora chub, and improve riparian condition, it will not preclude adverse impacts from livestock grazing. The necessary monitoring will need to be strictly adhered to in order to move toward satisfactory conditions in the riparian areas of this pasture. The habitat between the Tinaja exclosure and the border exclosure is intermittently occupied by Sonora chub year round, and direct effects from livestock grazing will continue because grazing will occur every other year during the spawning season. In addition, there is a 40 ac parcel of private land just above the northern boundary of the border exclosure that will allow livestock to have direct access to stream habitat between the riparian pasture and the border exclosure. Livestock presence in the stream channel may reduce the surface water and the connectivity of habitat between these two areas occupied by Sonora chub.

Effects in the Warsaw Pasture

The Warsaw pasture borders California Gulch on the west side of the drainage. Warsaw Canyon is a tributary to California Gulch. Warsaw pasture is 1833 ha (4,529 ac) with most of the pasture used as an upland pasture. Warsaw Canyon is an intermittent stream and there have been no Sonora chub observed using it. The majority of Warsaw Pasture and the west half of Ruby pasture have been classified as having impaired soil conditions based on a lack of ground cover and consequently poor conditions for water infiltration. This area has inherently low infiltration rates. As stated before, conditions on the uplands will indirectly affect the riparian conditions downstream. In general, grazing practices can change vegetation composition and abundance, and cause soil erosion and compaction, reduced water infiltration rates, and increased runoff (Ellison 1960, Arndt 1966, and Gifford and Hawkins 1978), leaving less water for plant production. Increased sedimentation will affect the reproduction of the Sonora chub.

Effects in Ruby Trap

The effects from livestock grazing in the Ruby Trap should be minimal due to the fact the livestock are proposed to be in the Ruby Trap pasture for two weeks prior to the livestock being shipped out. The effects from livestock grazing would be very similar in nature to the effects mentioned for the Ruby pasture.

Summary

Within California Gulch there are 6.4 km (4.0 mi) of potential habitat from the International border upstream to the Apache Dam. The lower 3.2 km (2.0 mi) between the International border and the Tinaja dam has perennial or near perennial water and is occupied year round by

Sonora chub when water conditions are appropriate. The Tinaja dam serves as a barrier to the movement of Sonora chub upstream. Therefore, the upper two miles of suitable habitat are not currently occupied. Within the lower 3.2 km (2.0 mi) of occupied habitat, there are two exclosures (one adjacent to the International border and one at the Tinja dam) which consist of about 0.4 km (0.25 mi) of stream. The remainder of the 2.8 km (1.75 mi) is subject to livestock grazing. The Coronado National Forest proposes a 700 ac. riparian pasture within the Shumaker pasture that would encompass the Sonora chub habitat. Up to 50 livestock would be permitted to graze in the riparian pasture every other year from mid-July to mid-October or until utilization levels reach 30 % on apical meristems or 14" stubble height of deergrass. Sonora chub is the only native fish in California Gulch. Sonora chub spawn at multiple times during spring through summer, most likely in response to flood or freshets during the spring and summer rains (Henderickson and Juarez-Romero 1990). Juvenile and larval chub have been observed in the 2.8 km (1.75 mi) reach between the exclosures during the months of July, August, and September; therefore, livestock grazing will occur coincident with chub (when water conditions are appropriate) every other year.

Sonora chub is typical of desert fishes that live in intermittent streams where the surface flow is influenced by variable weather patterns. The life history of these fish accomodates survival in dessicating pools followed by rapid, dispersal, reproduction, and colonization of channels newly-wetted by recent surface flow. Continued occupation of Sonora chub in California Gulch is highly dependent on the temporal and spatial extent of surface water in the channel. The amount and pattern of precipitation can not be controlled, but factors that influence the hydrology and aquatic conditions can be managed. Watershed conditions that reduce sediment movement from the uplands, channel conditions that promote proper sediment processing during high runoff events, and proper riparian conditions that allow shade, cover, bank stability, and pool development to occur will only help to ensure long-term survival of Sonora chub in California Gulch (USFS 2000).

Although impacts will be reduced significantly from past permitted use, the proposed action would continue substantial direct and indirect impacts to California Gulch Sonora chub habitat and associated riparian habitat. Overall, the entire occupied and suitable Sonora chub habitat will be adversely affected by the proposed action. The proposed action would result in direct livestock grazing within occupied Sonora chub habitat during spawning. The impacts to Sonora chub can include impaired reproduction, death of individuals by livestock trampling of egg masses and ingestion of larvae by livestock drinking pond water, continued degradation of existing chub habitat and inhibition of habitat improvement and expansion, thus adversely affecting the recovery of the species.

Direct and Indirect Effects on the Lesser long-nosed bat

Effects to lesser long-nosed bats resulting from the proposed grazing permit would occur through the grazing of forage plants (paniculate agaves and saguaros) and implementation of range projects. Both activities may reduce the abundance of forage (nectar sources) available to lesser long-nosed bats, and implementation of range projects may but are unlikely to disturb roosts.

The extent of adverse effects to *Leptonycteris* bats resulting from the potential reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat. Areas with patches of high densities of paniculate agaves and saguaros may be particularly important to these bats, especially if those high density sites are close to roosts. The distribution of agaves across the Forest has been estimated on a landscape level by evaluating the distribution of plant communities which include bat forage plants. However, the local abundance of these forage plants has not been included in this biological assessment prepared for this consultation. Given the ability of the bat to move freely and widely across the landscape, the large geographic scale of the analysis may be more meaningful to assess potential effects to the lesser long-nosed bat due to impacts to its foraging habitat by livestock.

The Coronado National Forest has committed to not disturbing or modifying any bat roost sites on any allotments (USFS 1998c), although the Forest does not detail how such effects will be avoided. Range project construction is also implemented so that no more than one percent of agaves and saguaros within 800 m (0.5 mi) of the project are affected. Undetected roosts probably occur within the Montana Allotment. In addition, some old records of historic roost sites for lesser long-nosed bats have not been re-surveyed for 20 or more years. For example, one of the historic sightings was in June 1959 (AGFD HDMS). Direct disturbance or modification of these roosts could occur because of range projects constructed as part of the grazing program.

Impacts to forage plants through implementation of the range management program may occur through direct herbivory and trampling by livestock, alteration of the vegetation community, degradation of soil and watershed conditions, modification of the fire regime, and range projects. The Coronado National Forest has provisions in place to reduce effects to agaves from construction and maintenance activities associated with grazing management. Prescribed fire, herbicide application, and seeding of non-native plants are not part of the proposed actions. As these types of projects are proposed, they will be addressed under site-specific consultations.

Saguaros may be impacted both directly and indirectly by grazing activities. Saguaros occur on slopes, bajadas, and in valleys. Impacts due to livestock grazing activities may occur from trampling of young saguaros, grazing of nurse plants which results in reduction or removal of protective cover, or grazing of the young saguaros themselves (Abouhalder 1992). Nurse plants, which shade sensitive saguaro seedlings, may be reduced by grazing, and germination sites may be adversely altered due to soil compaction, erosion, and reduced infiltration. Livestock seek shade under trees, and forage for annual vegetation within shrub and tree cover. Benson (1982) noted grazing that has obliterated seedbeds of saguaros. Neiring et al. (1963) found that enhanced reproduction of saguaros on slopes was correlated with reduced localized levels of grazing. However, by mid-summer when most bats arrive on the Forest from maternity roosts farther to the west, saguaros have completed flowering and no longer provide a food source for the lesser long-nosed bat. The distribution and abundance of saguaros on the Montana Allotment is minimal compared to the agaves.

No long-term investigation has quantitatively documented the effect of grazing on agave mortality or flowering stalk herbivory. Individual paniculate agave plants only bloom once in their life of about 20 years. However, agave stalks are rich in carbohydrates, and as they begin to bolt are particularly palatable to domestic livestock and wild herbivores, including deer, javelina, rodents, and rabbits (Howell 1996; M. Hawks, University of Arizona, pers. comm., 1997; Hodgson, pers. comm., 1997). The desirability of these stalks in early spring is likely influenced by availability of quality forage in the area. Under conditions of inadequate precipitation to facilitate a spring green-up, especially when high levels of utilization are reached or following range fires, cattle as well as local wildlife may seek out agave stalks (Tricia Roller, Arizona Ecological Service Field Office, pers. comm., 1997). Cattle have been known to "walk down" agave flowering stalks (T. Cordery, Arizona Ecological Services Field Office, pers. comm., 1998). Cattle probably trample young agaves, causing some level of mortality among these plants. Range personnel in the Nogales District have observed agaves shoots that have been chewed on and stalks that have been layed over in pastures where livestock graze in the Montana Allotment. Agave germination and seedling establishment may be influenced by degraded ecological conditions such as soil compaction, erosion, reduced infiltration, and altered plant species composition. Effects on bat forage plants due to livestock grazing are expected to be more intense where livestock congregate near water sources and less intense on steep slopes or among rocks where grazing is generally lighter and agaves are at higher densities.

Effects of livestock grazing on fire frequency and intensity, and subsequent effects to agaves and floral resources for bats are complex. Before about 1900, widespread surface fires occurred in the Madrean borderlands. These frequent ground fires ceased to occur about the time intensive livestock grazing began (Swetnam and Baisan 1996). Although other factors likely played some role in the elimination of frequent ground fires, most authors agree that livestock grazing was probably the most important, at least before effective fire suppression began in the 1930's (Bahre 1991, 1995, Swetnam and Baisan 1996, Danzer et al. 1997). Livestock grazing removes dried herbaceous fine fuels that normally carry fire. Without fire, ladder fuels and woody material build up in woodlands. The result is that when fires finally do occur, they can be catastrophic and stand-replacing (Danzer et al. 1997). How this change in fire frequency and intensity caused in part by livestock grazing affects agave populations is unknown. In the absence of frequent ground fires, agave populations could potentially benefit due to reduced mortality resulting from fire. However, infrequent intense fires could kill greater percentages of agaves when fires occur, if agaves are growing amid brush or other areas of high fuel loads.

Other factors are important in determining the effects of livestock grazing on fire regimes and subsequent effects to agaves and floral resources. Activities that directly or indirectly promote invasions or increased density of nonnative grasses, particularly Lehmann lovegrass, may result in increased fire frequency or intensity, reduced densities of Palmer’s agave, and thus reduced floral resources for the lesser long-nosed bat. Lehmann lovegrass is abundant in some portions of the Coronado National Forest, especially the Tumacacori, Huachuca, Santa Rita, and Santa Catalina EMA's and its relative abundance has been positively correlated with livestock grazing intensities (Anable et al. 1992, McClaran and Anable 1992). This species increases after fire (Martin 1983, Ruyle et al. 1988, Sumrall et al. 1991, Howell 1996), but also produces an abundance of fine fuel that promotes hot fires (McPherson 1995). Thus, frequent fire is likely to increase the abundance of Lehmann lovegrass, and increased abundance of this grass can fuel more fires and hotter fires, creating a positive feedback loop (Anable et al. 1992). Livestock grazing, especially at high utilization levels, often promotes the increase of non-native and less-palatable species, which may influence the resulting fire regime. Often the objectives of livestock management are to increase the abundance of grasses while the direct impacts of livestock herbivory are the reduction of grass cover. Grasses are probably one of the strongest competitors with agave seedlings (Burgess, pers. comm., 1997). Increased abundance of grass could result in reduced agave abundance. When overgrazing results in declines of perennial grasses (Martin and Cable 1974, Eckert and Spencer 1987), there may be less competition between grasses and agaves. However, there may also be increased trampling of smaller agaves by livestock, and increases in woody/shrub vegetation results in an altered fire regime.

Grazing utilization levels over 40 percent are considered damaging to the ecosystem (Martin 1975, Eckert and Spencer 1987, Holechek et al. 1998). How these or other specific levels of utilization are directly correlated to effects on agaves is not known. However, as utilization levels or stocking levels increase, effects to the vegetation community and agaves also increase. No information is available on the relationship of grazing management systems and utilization levels to the associated effects on agaves. The Coronado National Forest has initiated and is committed to completing a multi-year study on agave ecology and the relationship to livestock management. This type of information is needed to make fully informed decisions regarding the effects of livestock management to the lesser long-nosed bat.

Central to the issue of evaluating adverse effects due to livestock impacts to forage plants of post-breeding *Leptonycteris* bats is the question, are agave floral resources potentially limiting to the bat? Limited information is available on bat foraging ecology and energetics, as well as the relation of livestock use to agave mortality, and weather parameters to agave bolting. Though many, many paniculate agaves are present across the landscape, it is not understood if all these are equally available and desirable to the bat. Slauson (pers. comm, 1999) believes that agave nectar is not limiting to lesser long-nosed bats. This conclusion is based on her pollination biology study of Palmer's agave (Slauson 1999) in which bat visitation and quantities of available nectar were monitored. Nighttime observations were conducted at several sites for a total of over 15 hours of periodic observations. In addition, floral nectar was always abundant at her sites and not depleted by pollinators. Slauson (1999) discussed possible factors related to the lack of observed bat visitations: 1) during stormy or windy weather, bat foraging distances and activity may decrease; 2) sufficient food resources for the number of bats present may have been available closer to the roost; and 3) other foraging sites may have been preferred. Some of the observation sites were in areas where *Leptonycteris* bats are widely dispersed. The relationship of foraging areas to roost sites, especially large roosts, is important in land management decisions. Availability of large roost sites is considered a major limiting factor to the bats (USFWS 1997b). Affecting forage resources in proximity to roosts may affect a substantial portion of the bat population in Arizona, and may affect the desirability of a particular roost site.

Livestock use in the Montana Allotment may affect the availability of floral resources, adult plant mortality, and seedling mortality, and therefore adversely affect the lesser long-nosed bat and its forage base in a variety of ways. *Leptonycteris* bats are opportunistic foragers and are capable of long distance flights. Temporary and minor shifts in the abundance of flowering agaves as an available resource for these bats are expected to have limited adverse effects. However, as these impacts to lesser long-nosed bat food resources occur across large portions of the landscape, bat survivorship may be reduced through increased foraging flight distances and related energy expenditures, increased exposure to predators, changes in use patterns of limited large roost sites, and potential disruption of the "nectar corridor." These effects may be most evident in those years where weather patterns, fire, or other causes have also affected agaves. The long-term effect of livestock use contributes to ecosystem based changes. The net result is that there are effects from livestock activities across the landscape to the ecosystem upon which the lesser long-nosed bat depends. Exactly how this alters the distribution and abundance of agaves, and to what degree this may impact lesser long-nosed bat populations is uncertain.

Direct and Indirect Effects to Chiricahua leopard frog

The effects of livestock grazing on ranid frog populations are not well-studied. Munger *et al.* (1994) found that sites with adult Columbia spotted frogs (*Rana luteiventris*) had significantly less grazing pressure than sites without spotted frogs. However, in a subsequent survey he found no differences (Munger *et al.*1996). Bull and Hayes (2000) evaluated reproduction and recruitment of the Columbia spotted frog in 70 ponds used by cattle and 57 ponds not used by cattle. No significant differences were found in the number of egg masses or recently metamorphosed frogs in grazed and ungrazed sites. Seventeen percent of the sites were livestock tanks. The California red-legged frog (*Rana aurora draytonii*) coexists with managed livestock grazing in many places in California. Ponds created as livestock waters have created habitats for red-legged frogs and livestock may help maintain habitat suitability by reducing coverage by cattails, bulrush, and other emergent vegetation (US Fish and Wildlife Service 2000). On the other hand, exclusion of cattle from the Simas Valley, Contra Costa County, corresponded with reestablishment of native trees and wetland herbs, reestablishment of creek pools, and expansion of red-legged frog populations (Dunne 1995).

Maintenance of viable populations of Chiricahua leopard frogs is thought to be compatible with well-managed livestock grazing. Grazing occurs in most of the habitats occupied by this frog. For instance, a large and healthy population of Chiricahua leopard frogs coexists with cattle and horses on the Tularosa River, New Mexico (Randy Jennings, Western New Mexico University, pers. comm. 1995). Effects of grazing on Chiricahua leopard frog habitat probably include both creation of habitat and loss and degradation of habitats. Construction of tanks for livestock has created important leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats (Sredl and Saylor 1998). Sixty-three percent of extant Chiricahua leopard frog localities in Arizona are stock tanks, versus only 35 percent of extirpated localities (Sredl and Saylor 1998), suggesting Arizona populations of this species have fared better in stock tanks than in natural habitats. Stock tanks provide small patches of habitat, which are often dynamic and subject to drying and elimination of frog populations. However, Sredl and Saylor (1998) also found that stock tanks are occupied less frequently by nonnative predators (with the exception of bullfrogs) than natural sites.

Adverse effects to the Chiricahua leopard frog and its habitat as a result of grazing may occur under certain circumstances. These effects include facilitating dispersal of nonnative predators; trampling of egg masses, tadpoles, and frogs; deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease (U.S. Fish and Wildlife Service 2000, Belsky *et al.* 1999, Ohmart 1995, Hendrickson and Minckley 1984, Arizona State University 1979, Jancovich *et al.* 1997). Creation of livestock waters in areas without aquatic habitats may provide the means for nonnative predators, such as bullfrogs and crayfish, to move across arid landscapes that would otherwise serve as a barrier to their movement. Increased erosion in the watershed caused by grazing can accelerate sedimentation of deep pools used by frogs (Gunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Eggs, tadpoles, and metamorphosing Chiricahua leopard frogs are probably trampled by cattle on the perimeter of stock tanks and in pools along streams (US Fish and Wildlife Service 2000). Juvenile and adult frogs can probably avoid trampling when they are active. However, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997), where they may be subject to trampling during the winter months. Cattle can remove bankline vegetation cover that provides escape cover for frogs and a source of insect prey. However, dense shoreline or emergent vegetation in the absence of grazing may favor some predators, such as garter snakes (*Thamnophis* sp.), and the frogs may benefit from some open ground for basking and foraging. At a tank in the Chiricahua Mountains, Sredl *et al.* (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die off of Chiricahua leopard frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die off.

Chytrid fungus can survive in wet or muddy environments, and could conceivably be spread by cattle carrying mud on their hooves and moving among frog habitats. The disease could also be spread by ranch hands working at an infected tank or aquatic site and then traveling to another site with mud or water from the first site. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, boots, or other equipment. Chytrids cannot survive complete drying, thus, if equipment is allowed to thoroughly dry, the likelihood of disease transmission is much reduced. Bleach or other disinfectants can also be used to kill chytrids (Loncore 2000). Chytrids, if not already present, could immigrate to the Montana allotment naturally via frogs or other animals from Sycamore Canyon, where chytridiomycosis is known to occur.

Chytrids could also be moved among aquatic sites during intentional introductions of fish or other aquatic organisms. Anglers commonly move fish, tiger salamanders, and crayfish among tanks and other aquatic sites to establish a fishery or a source of bait, or in some cases bait is released at an aquatic site during angling. Water, salamanders, or perhaps fish and crayfish could all be carriers of chytrids. In addition to possibly introducing chytrids, such activities would also facilitate introduction of nonnative predators with which the Chiricahua leopard frog cannot coexist. Maintenance of roads and tanks needed for the grazing program could provide fishing opportunities and facilitate access by anglers, hunters, or other recreationists, who may inadvertently introduce chytrids from Sycamore Canyon or other locales, or may intentionally introduce nonnative predators for angling or other purposes.

The current grazing regime on the Montana allotment was established in 1988. Since that time, riparian tree parameters in lower California Gulch, ground cover, range vegetation conditions, and grass forage production have all improved (Coronado National Forest 2000). Allowable use of upland species in all pastures is a maximum of 45 percent of key species (hairy grama and sideoats grama) in key areas. Use of deer grass in the riparian pasture would be measured by stubble height, which would be no less than 14 inches when the livestock leave the pasture. A maximum use of 30 percent of apical meristems of riparian trees and shrubs (up to 6 feet in height) would also be applied in the riparian pasture. Salt and supplements would be placed a minimum of 0.25 mile away from water and low areas to discourage cattle use in riparian habitats. The fence along the international boundary, which forms the lower end of the riparian pasture, would be maintained by the Coronado Forest.

Holecheck *et al.* (1998) recommend average utilization levels of 25-40 percent in arid regions of the Southwest where precipitation is less than 11.8 inches (annual average precipitation in the Montana allotment is 16-22 inches). They found that generally, as average precipitation increases, utilization can increase. Within the range of utilization rates given, several factors determine whether a low, medium, or high value should be selected. Holecheck *et al.* (1998) suggest that on ranges in good condition with relatively flat terrain and good water distribution, the higher utilization limit may be appropriate. If the range is in poor or fair condition, or the allotment has thin soils, rough topography, and poor water distribution, the lower utilization rate may be appropriate. Martin and Cable (1974) found that an average of 40 percent utilization on rangeland at the Santa Rita Experimental Range maintained perennial grasses over a 10-year period. Also on the Santa Rita Experimental Range, Martin (1973) recommended resting pastures during spring-summer and winter two years out of three if forage consumption is limited to 50-60 percent utilization. Martin (1975) also recommended stocking cattle at no more than 90 percent of average proper stocking, but with some reductions during prolonged severe drought. Range condition on the Montana allotment is primarily in good condition. Because riparian tree parameters in lower California Gulch, ground cover, range vegetation conditions, and grass forage production have all improved since implementing changes in 1988, this suggests current and proposed grazing practices will maintain riparian condition in lower California Gulch.

Holden Canyon, the site probably most likely to support Chiricahua leopard frogs, is in the Warsaw Pasture. Other sites likely to be occupied by frogs are in the Schumaker Pasture and the riparian pasture along California Gulch. The Warsaw and Schumacher pastures are proposed to be grazed from mid-July (but not before the start of the monsoon) through mid-October. The riparian pasture would be grazed in conjunction with the Schumacher Pasture (also during mid-July through mid-October). Chiricahua leopard frogs breed and deposit egg masses from March through August. Frogs at elevations below 5,900 feet (such as in the Montana allotment) typically deposit egg masses from spring through late summer, but most activity is before June (Frost and Platz 1983). Thus, most egg deposition is likely to have been completed when cattle are in pastures most likely to be occupied by Chiricahua leopard frogs. However, some potential still exists for trampling of egg masses deposited later in the season. Young tadpoles or metamorphosing frogs that overwintered as tadpoles could also be trampled.

The Coronado National Forest has proposed utilization limits on riparian trees and shrubs in California Gulch to minimize damage to riparian vegetation. Chiricahua leopard frogs appear able to coexist with riparian grazing under a variety of circumstances; and we are not aware of evidence suggesting they could not coexist under the grazing regime proposed for California Gulch. No special measures for grazing riparian habitat have been proposed in Holden Canyon, the site probably most likely to support Chiricahua leopard frogs. We suspect that cattle may congregate in Holden Canyon, but they would not be in the area during the pre-monsoon season, when cattle are most likely to stay near water sources and do the most damage to riparian systems. Without more site-specific information about cattle use in Holden Canyon and effects to vegetation, soils, and frog habitat, we cannot evaluate in detail possible effects to Chiricahua leopard frogs or their habitat.

Stock tank maintenance would typically occur when tanks are dry or nearly dry. At that time, dams would be repaired or silt would be dredged out of the tanks. During drought, many leopard frogs probably disperse from drying tanks or are killed by predators as waters recede. However, some frogs persist in cracks in the mud of pond bottoms (M. Sredl pers. comm. 1999) or in clumps of emergent vegetation. Halfmoon Tank in the Dragoon Mountains went dry during June 1996 for 30 days or more. On July 21, 1996, 29 frogs of several different size classes were counted after the tank refilled with the summer monsoons (J. Rorabaugh pers. obs.). Frogs probably took refuge in thick mats of cattails around the tank, but may have also stayed in cracks in the drying mud of the pond bottom, in rodent burrows, or other retreats that stayed moist. Frogs present in mud or in emergent vegetation could be killed or injured during silt removal or berm repair. If not killed, they may be flushed from moist retreats and die of exposure or dessication, or be killed by predators. If remaining wetted soils and emergent vegetation are completely disturbed or removed during cleaning out of a tank, a frog population could possibly be eliminated.

The proposed action includes development of Schumacher Spring. This spring is about 1.2 miles west of Sycamore Canyon, a site known to be occupied by Chiricahua leopard frogs. The dispersal abilities of Chiricahua leopard frogs are not well understood, but 1.2 miles (even overland) is probably within dispersal distance for this species (P. Rosen, pers. comm. 1999).

Thus, if Chiricahua leopard frogs do not currently occupy Schumacher Spring, they are likely to in the future, if suitable habitat exists there. "Development" of the spring was not defined. However, this action could conceivably improve habitat if it created more dependable pool habitat, or could reduce or eliminate habitat if water was confined to a metal tank or trough that is unavailable to frogs. Attempts to develop Birch Spring in the Animas Mountains, Hidalgo County, New Mexico, resulted in decreased flows and extirpation of the Chiricahua leopard frog population there (N. Scott, pers. comm.).

The present effects to the Chiricahua leopard frog from the proposed action are most likely in the riparian (in or associated with wetted areas) and wetland communities within the Montana Allotment. These effects may include dispersal of nonnative predators such as creation of livestock waters in areas not classified as aquatic habitat thereby providing a means for nonnative predators to move across the landscape that otherwise might act as a barrier to their movement. Grazing effects would also result from the trampling of egg masses, tadpoles, and frogs from livestock having direct access to aquatic habitat. The introduction of diseases such as chytrids can move among aquatic sites either by intentional introductions or aquatic organisms. Increased poor water quality has effects on the Chircahua leopard frog due to cattle use of stock tanks including elevated hydrogen sulfide concentration. However, well-managed livestock grazing can be compatible with maintenance of Chiricahua leopard frogs and the development of Schumaker spring may improve the available water source.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to the section 7 of the Act.

Several parcels of private land exist within the Montana Allotment. Activities occurring on these private lands that would be cumulative to the proposed action include residential use, roads, and livestock grazing. Impacts from the number of livestock grazing on the private parcels are unavailable as well as their management. However, the effects of this activity would be similar to the watershed effects described for the proposed action.

Mining activities occur on the Montana Allotment in the watershed above California Gulch. Additional excessive sediments are contributed to California Gulch as a result of mine spills, and use of roads on private land. Mining activity can also introduce toxic chemicals into stream channels and with the additional sediment increase turbidity and decrease water quality.

Although the majority of recreational use is most likely on public lands, use does occur on private land and includes road construction/maintenance, camping areas, and off-road vehicles use. Recreation use contributes to habitat modification in both the uplands and the riparian areas with increased sediment, erosion, and reduced infiltration.

CONCLUSION

After reviewing the current status of the Sonora chub, lesser long-nosed bat, and the proposed Chiricahua leopard frog, the environmental baseline for the action area, the anticipated effects of the proposed grazing program, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonora chub, lesser long-nosed bat, or the Chiricahua leopard frog. Critical habitat has not been designated for the lesser long-nosed bat and Chiricahua leopard frog, and critical habitat was not designated for Sonora chub within the proposed project area; therefore, none will be affected. Our conclusion that the proposed action is not likely to jeopardize the continued existence of the Sonora chub, lesser long-nosed bat, or the Chiricahua leopard frog is based on the following:

1. The proposed action proposes to reduce the adverse effects from livestock grazing on the occupied Sonora chub habitat through implementing a riparian pasture and reducing the number of cattle allowed to use the proposed riparian pasture. However, due to the degree of exposure on this area from livestock grazing during spawning, the proposed action may delay the recovery potential of the Sonora chub.

2. The majority of the Sonora chub population exists in Sycamore Canyon, a nearby drainage, where it appears stable with suitable habitat and additional protection from land use practices. Due to the topography and the current grazing management, livestock are not permitted to graze Sycamore Canyon. Because the percentage of Sonora chub population in California Gulch makes up a smaller portion of the overall species range, protecting this additional small population will only help to enhance the reproduction and survival of this species.

3. Rangeland and riparian improvements are expected as a result of the reduced utilization levels.

4. Currently, there are no known lesser long-nosed bat roosts on Montana Allotment. Although adverse effects to agaves, a crucial forage resource, are anticipated, the effects are not anticipated to substantially reduce or impact post-breeding populations of the bat.

5. The Chiricahua leopard frog occurs over a large area of eastern Arizona, western New Mexico and portions of northwestern Mexico. The proposed action affects a very small portion of the species' range.

6. The Chiricahua leopard frog can coexist with well-managed livestock grazing.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act prohibits the take of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of a listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with this incidental take statement.

Amount and Extent of Take

Sonora chub

The Service anticipates that take of all Sonora chub in the 2.8 km (1.75 mi) of unprotected occupied habitat between the border exclosure and the "tinaja" exclosure will occur. The incidental take of Sonora chub will result from direct mortality from livestock trampling of fish and egg masses, ingestion of larvae, and through indirect mortality resulting from habitat loss or alteration. Adult, larval, or juvenile Sonora chub or eggs may be killed by being smothered by excess sediment and erosion contributed by livestock grazing.

The anticipated level of incidental take cannot be directly quantified because of presumed very low numbers of Sonora chub in the project area, potentially rapid population fluctuations inherent in desert fish populations, changes in stream habitat distribution over time, the uncertain extent and location of project-level components of the proposed action, such as range improvement projects, and uncertainties regarding effects of such activities on Sonora chub. In cases where the extent of anticipated take cannot be quantified accurately in terms of number of individuals, the Service may anticipate take in terms of loss of surrogate species, food, cover, or other essential habitat elements, such as water quality or quantity (U.S. Fish and Wildlife Service 1999). Increased water temperatures will result from direct impacts from livestock drinking stream water and widening of stream channel from livestock grazing and trampling streambanks which results in the water column becoming shallow. Anticipated take will be considered to have been exceeded if: (1) immediate action is not taken to remove, as soon as possible, any cattle found on National Forest lands in the proposed riparian pasture within California Gulch, (2) long-term trends in range condition in the allotment deteriorates, and livestock grazing cannot be ruled out as a cause of the deterioration.

Lesser long-nosed bat

The Service does not anticipate take of lesser long-nosed bat as a result of the proposed action.

Chiricahua leopard frog

Because the occurrence of Chiricahua leopard frogs on the allotment is uncertain, and because the status of the species could change over time through immigration, emigration, and loss or creation of habitats, the precise level of take resulting from this action cannot be quantified. However, given the presence of Chiricahua leopard frogs on the allotment as recently as 1995 (Holden Canyon and California Gulch), the proximity to Sycamore Canyon where a population of Chiricahua leopard frogs is extant, and lack of recent survey data, Chiricahua leopard frogs are likely to occur during the life of the project (10 years). We estimate that take could occur in the following fashion:

1. Mortality of all frogs at one livestock tank due to maintenance activities.

2. Trampling and destruction of egg masses, small tadpoles, and metamorphs.

3. Mortality and lost productivity due to alteration of habitats during development at Schumacher Spring.

4. Mortality of recently metamorphosed frogs at one locality (livestock tank, stream, or spring) due to unintentional introduction of chytridiomycosis resulting from cattle moving among frog populations or unintentional transport of water or mud among aquatic sites by ranch hands.

5. Mortality and lost productivity due to sedimentation of pools, loss of bankline and emergent cover, and other forms of habitat degradation in Holden Canyon or other sites where Chiricahua leopard frogs may occur.

In cases where the extent of anticipated take cannot be quantified accurately in terms of number of individuals, the Service may anticipate take in terms of loss of a surrogate species, food, cover, or other essential habitat elements, such as water quality or quantity (US Fish and Wildlife Service 1998). Thus, in addition to the parameters listed above, the following will also be used to determine if incidental take has been exceeded:

1. Cattle are moved into the Schumacher, Warsaw, or Riparian pastures during March through May.

EFFECT OF THE INCIDENTAL TAKE

In this biological opinion, the Service finds the anticipated level of take is not likely to result in jeopardy to the Sonora chub nor the Chiricahua leopard frog or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

Sonora Chub

The Service believes the following reasonable and prudent measures (RPM) are necessary and appropriate to minimize the incidental take of Sonora chub. The reasonable and prudent measures described below are non-discretionary, and must be implemented by the Coronado National Forest so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. Coronado National Forest has a continuing duty to regulate the activity covered by this incidental take statement. If Coronado National Forest (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight or ensure compliance with these terms and conditions, the protective coverage of sections 7(o)(2) may lapse.

1. The Coronado National Forest shall minimize direct mortality of Sonora chub.

2. The Coronado National Forest shall minimize the loss and alteration of Sonora chub habitat.

3. The Coronado National Forest shall continue to monitor Sonora chub and their habitat to document levels of incidental take.

4. The Coronado National Forest shall monitor livestock grazing activities and maintain complete and accurate records of actions which may result in take of Sonora chub and report the results to the Service.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Coronado National Forest must comply with the following terms and conditions in regard to the proposed action. These terms and conditions implement the reasonable and prudent measures described above. Terms and conditions are nondiscretionary.

The following terms and conditions implement reasonable and prudent measure number 1:

1a. All reasonable efforts shall be made to remove any livestock from the proposed riparian pasture and existing exclosures as soon as discovery of fence damage and livestock intrusion occurs. The Service shall be notified within 24-48 hours upon observation of livestock intrusion.

The following terms and conditions implement reasonable and prudent measure number 2:

2a. All reasonable efforts shall be made to minimize channel and floodplain alterations during construction of the riparian fence. A written report shall be submitted to the Service within 60 days of completion of project activity. The report shall include photographs of the project area before and after project implementation.

2b. All reasonable efforts shall be made to ensure that no pollutants enter surface waters during action implementation. No toxic chemicals (including petroleum products) shall be stored or deposited within the floodplain during construction and maintenance of all proposed fences. An appropriate spill response kit for cleaning up accidental releases of petroleum products will be available at the work site whenever vehicles or machinery are present and at least one person present shall have training in use of that kit.

The following term and condition implements reasonable and prudent measure number 3:

3a. During proposed fence construction and maintenance and upon completion of these projects, the Coronado National Forest shall monitor for and document the presence of dead or dying fish in and for half-mile downstream of the activity area. The Service shall be notified immediately by telephone upon detection of any dying fish of any species.

The following terms and conditions implement reasonable and prudent measure number 4:

4a. Records will be maintained of downed or damaged exclosure fencing and incidents of livestock intrusion within the proposed riparian pasture in California Gulch. Reports to the Service should include dates of observations, sightings of any livestock use, number of livestock, area of use, and any other pertinent information. Copies of these reports will be sent annually to the Service.

4b. The Coronado National Forest shall submit an annual report to the Arizona Ecological Service Field Office. The report shall, at a minimum, briefly summarize for the previous calendar year: 1) the implementation of terms and conditions and reasonable and prudent measures, 2) documentation of take, and 3) any excessive use, increased animal months, unauthorized use, or other detrimental variations from the proposed actions. The report shall also make recommendations, as needed, for modifying or refining these terms and conditions to enhance protection of the Sonora chub or reduce needless hardship on the Coronado National Forest and its applicant. The report should be packaged with or be part of the annual report for the biological opinion on the On-going and Long-term Grazing on the Coronado National Forest (2-21-98-F-399).

The prohibitions against taking Chiricahua leopard frog found in section 9 of the Act do not apply until the species is listed. However, the Service recommends that the Coronado National Forest implement the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions, will be non-discretionary.

REASONABLE AND PRUDENT MEASURES

Chiricahua leopard frog

1. The Coronado National Forest shall continue to monitor Chiricahua leopard frog and their habitat to document levels of take.

2. Measures shall be implemented to reduce riparian habitat degradation and trampling of egg masses, tadpoles, and metamorph frogs.

3. Personnel education programs and well-defined operational procedures shall be implemented.

TERMS AND CONDITIONS

The following terms and conditions implement reasonable and prudent measure number 1:

1a. Prior to construction activities at Schumaker Spring, surveys shall be conducted for Chiricahua leopard frogs[1]. If the species is found at the spring, the Coronado shall develop with the Service a plan to minimize adverse effects to frogs. The plan shall be approved by the Service. If frogs are found within the project area reinitiation of consultation would be necessary.

1b. During spring of 2002, or in the next field season after listing, the Coronado shall survey Holden Canyon for Chiricahua leopard frogs[1] If frogs are found in Holden Canyon, the Coronado shall work with the Service to evaluate effects of the action on the frog and its habitat, and shall develop and plan with the Service to minimize the effects of the action on the frog.

The following term and condition implements reasonable and prudent measure number 2:

2a. If leopard frogs are found at sites other than Holden Canyon or Schumacher Spring, the Coronado shall inform the Service within 10 calendar days and shall work with the Service to develop plans for minimizing take of leopard frogs at those sites.

The following terms and conditions implement reasonable and prudent measure number 3:

3a. Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be moved among livestock tanks or other aquatic sites by the general public.
3b. If a site is identified as occupied by Chiricahua leopard frogs, water shall not be hauled to the site from another aquatic site or tank that supports leopard frogs, bullfrogs, crayfish, or fish.

3c. If Chiricahua leopard frogs are found on the allotment, the permittee shall be required to clean any equipment, boots, etc. used at an aquatic site and treat with a 10 percent bleach solution, or allow such equipment, boots, etc. to dry thoroughly, before using the same equipment, boots, etc. at another aquatic site on the allotment.

3d. All ranch hands, construction personnel, and others implementing the proposed action shall be given a copy of these terms and conditions, and informed of the need to comply with them.

3e. At least 20 days prior to maintaining or cleaning out livestock tanks, the permittee shall inform the Coronado of planned activities. The Coronado shall survey the tank for Chiricahua leopard frogs[1] and if frogs are found, shall work with the Service to develop and implement a plan to minimize take of frogs. Measures to minimize take should include salvage and temporary holding of frogs, limiting disturbance and work areas to the minimum area practicable, leaving stands of emergent vegetation in place, and/or measures to minimize that likelihood of disease transmission. Plans to minimize take shall be approved by the Service. The plan shall be approved by the Service. If frogs are found within the project area reinitiation of consultation would be necessary.

Deposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (480) 835-8289 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling are most active. A diurnal survey can substitute for a nocturnal survey, but if frogs are not detected, surveyors should return at night.

Deposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (480) 835-8289 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted as soon as possible to the nearest Fish and Wildlife Service or AGFD office, educational, or research institutions (e.g., University of Arizona in Tucson) holding appropriate State and Federal permits.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologists should transport

1 Surveys shall include a night visit to suitable habitat during which all or at least 1,200 feet of the best habitat along creeks and the entire perimeter of tanks are searched for frogs. Surveys shall be carried out with flashlights/headlamps, and a dip net shall be used to sample for tadpoles and frogs concealed in undercut banks or at the base of emergent vegetation. Watch for frogs on banklines, but also in water, and in areas away from water - particular during or after rains. Surveyors shall also listen for the distinctive call of the Chiricahua leopard frog (Davidson 1996) and watch for egg masses. Surveys shall be carried out from April-September and when water temperatures are at least 12 degrees Celcius and winds are light or absent, which is when frogs are most active. A diurnal survey can substitute for a nocturnal survey, but if frogs are not detected, surveyors should return at night.

injured animals to a qualified veterinarian. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purpose of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term conservation recommendations has been defined as Services suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibility for these species.

1. The Coronado National Forest should implement additional or expanded exclosures protecting occupied habitat in consultation with the applicant and the Service.

2. The Coronado National Forest should, in coordination with the Service, initiate a plan to remove or modify the existing dam within 1 year of decision notice for the Montana Allotment at the Tinaja to allow Sonora chub access to additional suitable habitat upstream. In addition, the Coronado National Forest should coordinate with the Arizona Game and Fish Department to assess the existing condition of the natural Sonora chub population to determine if an implementation plan for stocking Sonora chub is needed.

3. The Coronado National Forest should continue to implement the Sonora chub Recovery Plan as appropriate.

4. The Coronado National Forest should implement the lesser long-nosed bat recovery plan, as appropriate.

5. If listed, the Coronado National Forest should assist the Service in development and implementation of a recovery plan for the Chiricahua leopard frog.

6. The Coronado National Forest should work with the Service and Arizona Game and Fish Department to translocate the Chiricahua leopard frog to suitable habitats in the Sycamore Canyon - California Gulch area, thereby enhancing the metapopulation that exists in and around Sycamore Canyon.

7. The Coronado National Forest should conduct or support comprehensive surveys for the Chiricahua leopard frog in all suitable habitats on the Montana allotment.

8. The Coronado National Forest should work with the Service and Arizona Game and Fish Department to begin an aggressive program to control nonnative aquatic organisms on the Forest, particularly bullfrogs, fish, and crayfish.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed or proposed species, the Service requests notification of implementation of any conservation actions.

REINITIATION - CLOSING STATEMENT

This concludes the conference for grazing activities on the Montana allotment. You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if the Chiricahua leopard frog is listed. The request must be in writing. If the Service reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Coronado National Forest shall request reinitiation of consultation if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference (biological) opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the Chiricahua leopard frog has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect take. No take of the Chiricahua leopard frog may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation. Although not required, we recommend that the Coronado National Forest implement the reasonable and prudent measures and terms and conditions herein prior to our final listing decision. If the species is subsequently listed, implementation of reasonable prudent measures and terms and conditions in any conference opinion adopted as a biological opinion, is mandatory.

This concludes formal consultation on the action(s) outlined in the (request/reinitiation request). As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your interest in furthering the conservation of these species. If we can be of further assistance, please contact Sherry Barrett at the Arizona Ecological Services Suboffice (520) 670-4617. Please refer to number 2-21-00-F-344 in future correspondence concerning this consultation.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: Regional Director, U.S. Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Forest Supervisor, Coronado National Forest, Tucson, AZ.
District Ranger, Coronado National Forest, Nogales, AZ.

John Kennedy, Director, Arizona Game and Fish Department, Phoenix, AZ.

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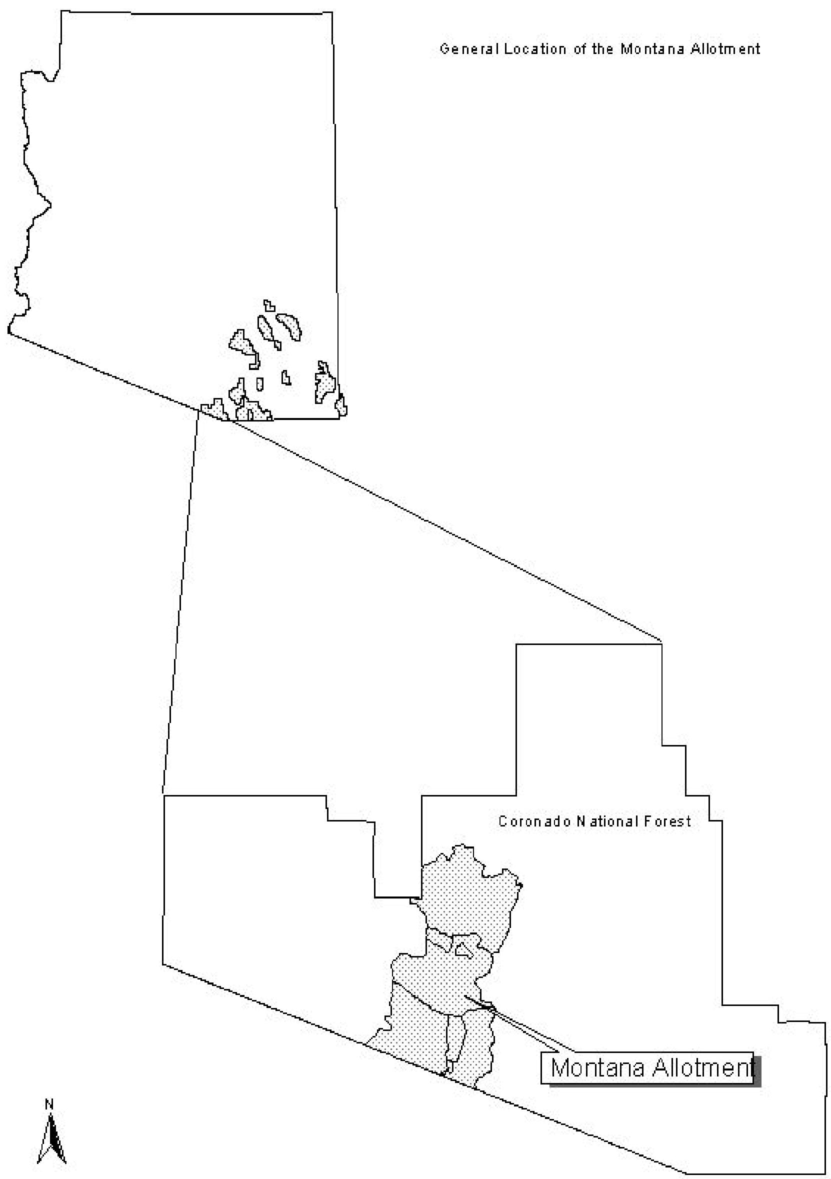
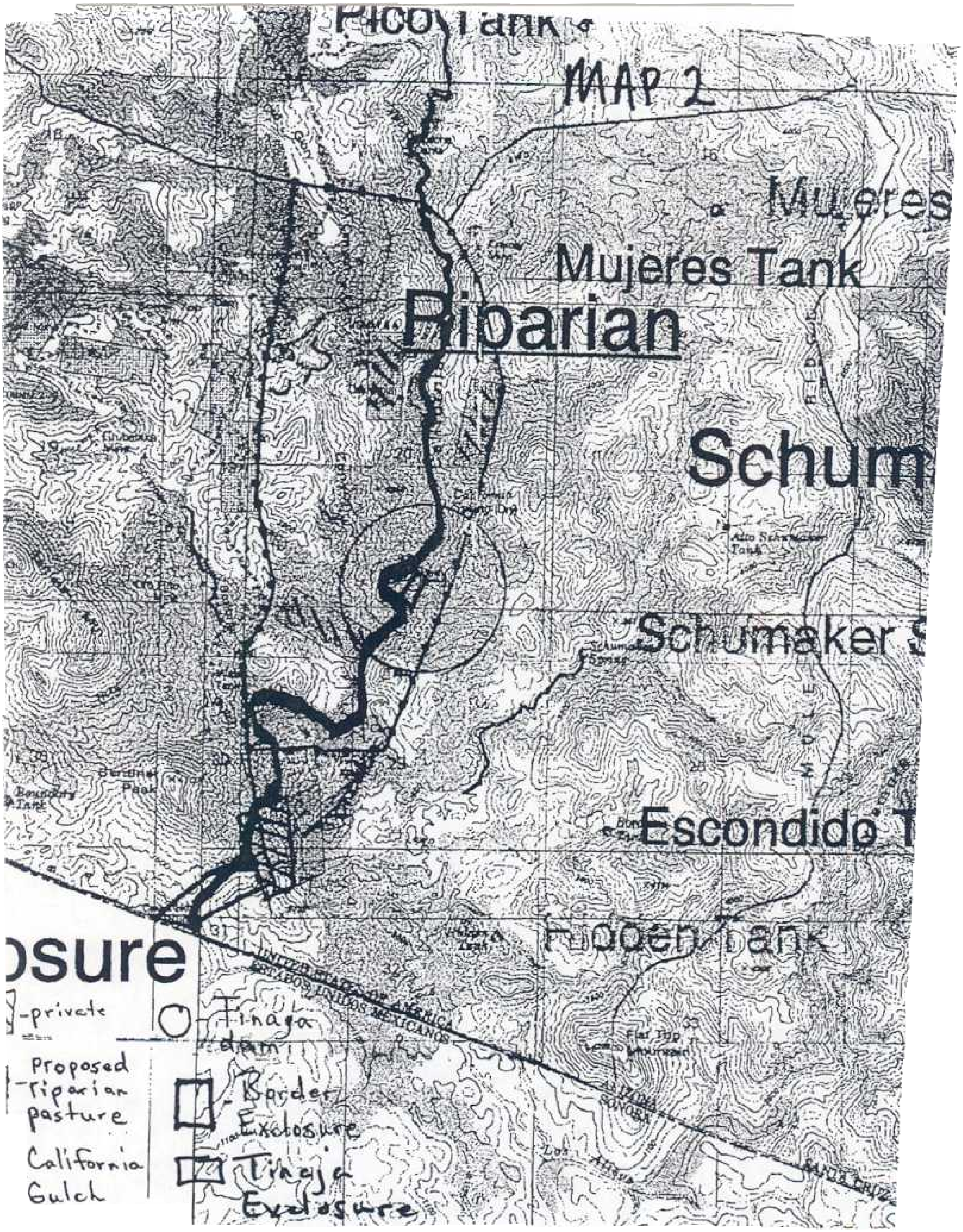
Appendix
Map 1.




MAP 2
Mujeres
Mujeres Tank
Riparian
Schum
Schumaker S
Escondido T
osure
-private
Tinaja dam
Proposed riparian pasture
California Gulch
Border Exclosure
Tinaja Exclosure
UNITED STATES OF AMERICA
ESTADOS UNIDOS MEXICANOS
ARIZONA
SONORA

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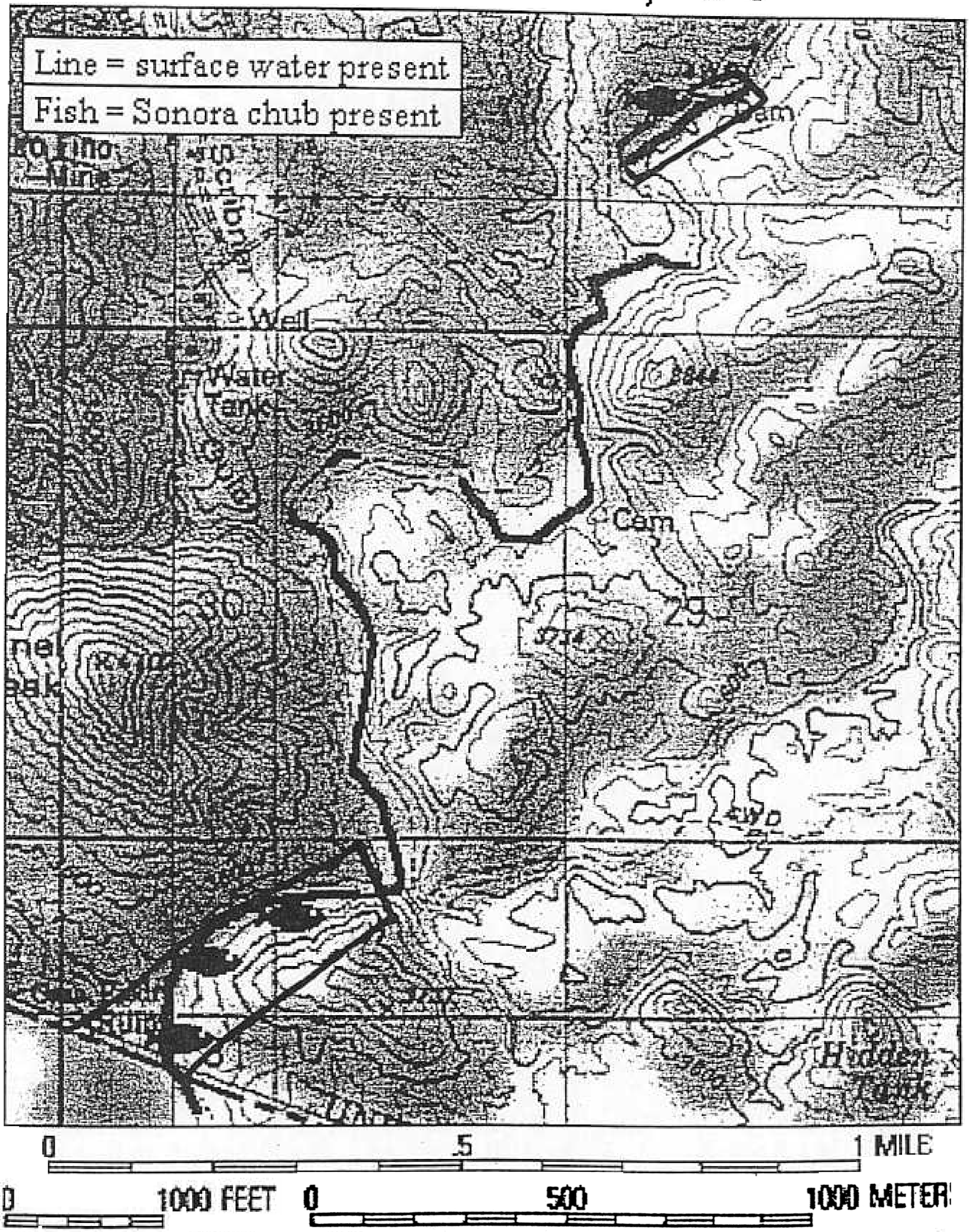

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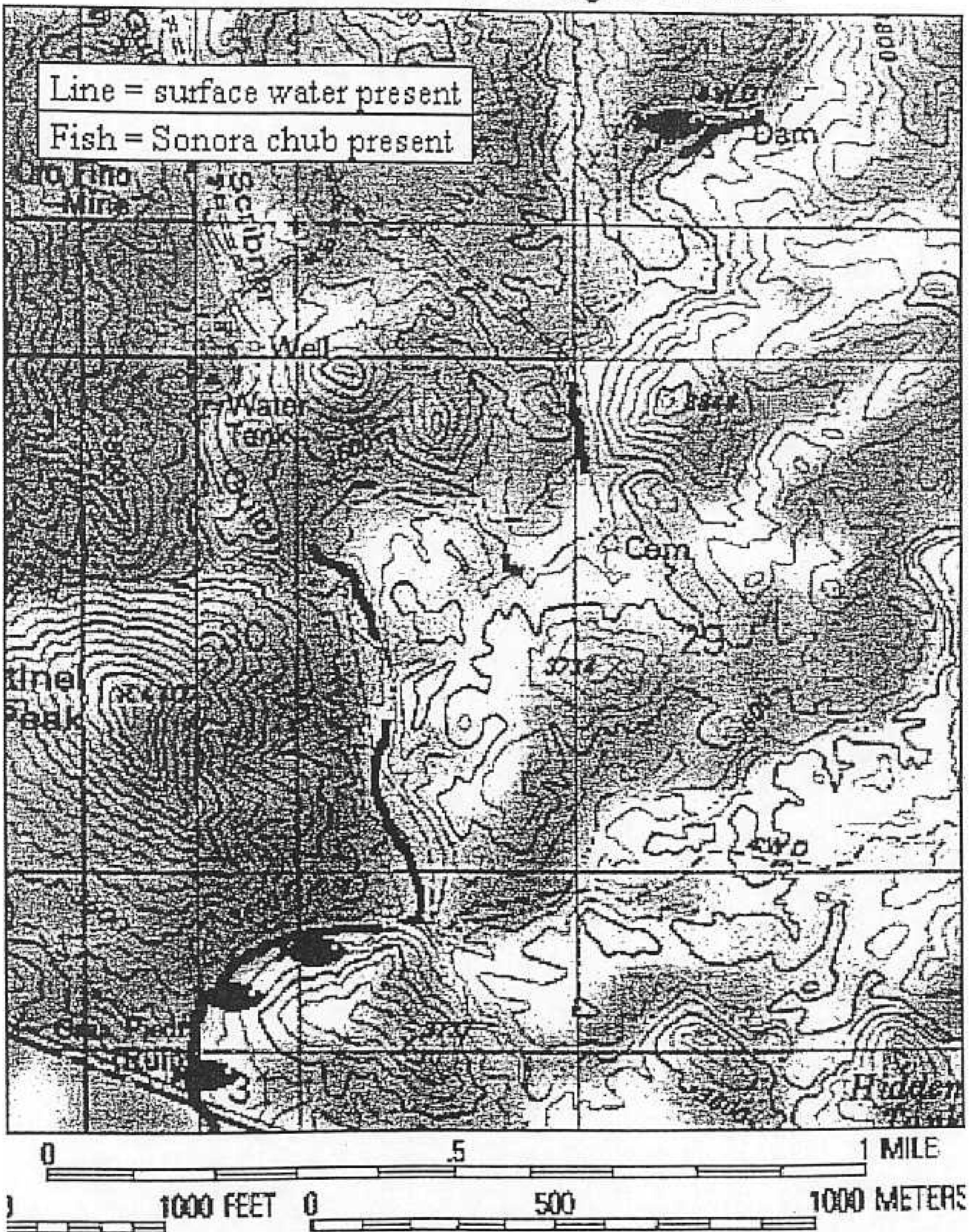
= exclosures (Sonora chub)

3b

2- California Gulch, 4 August 2000



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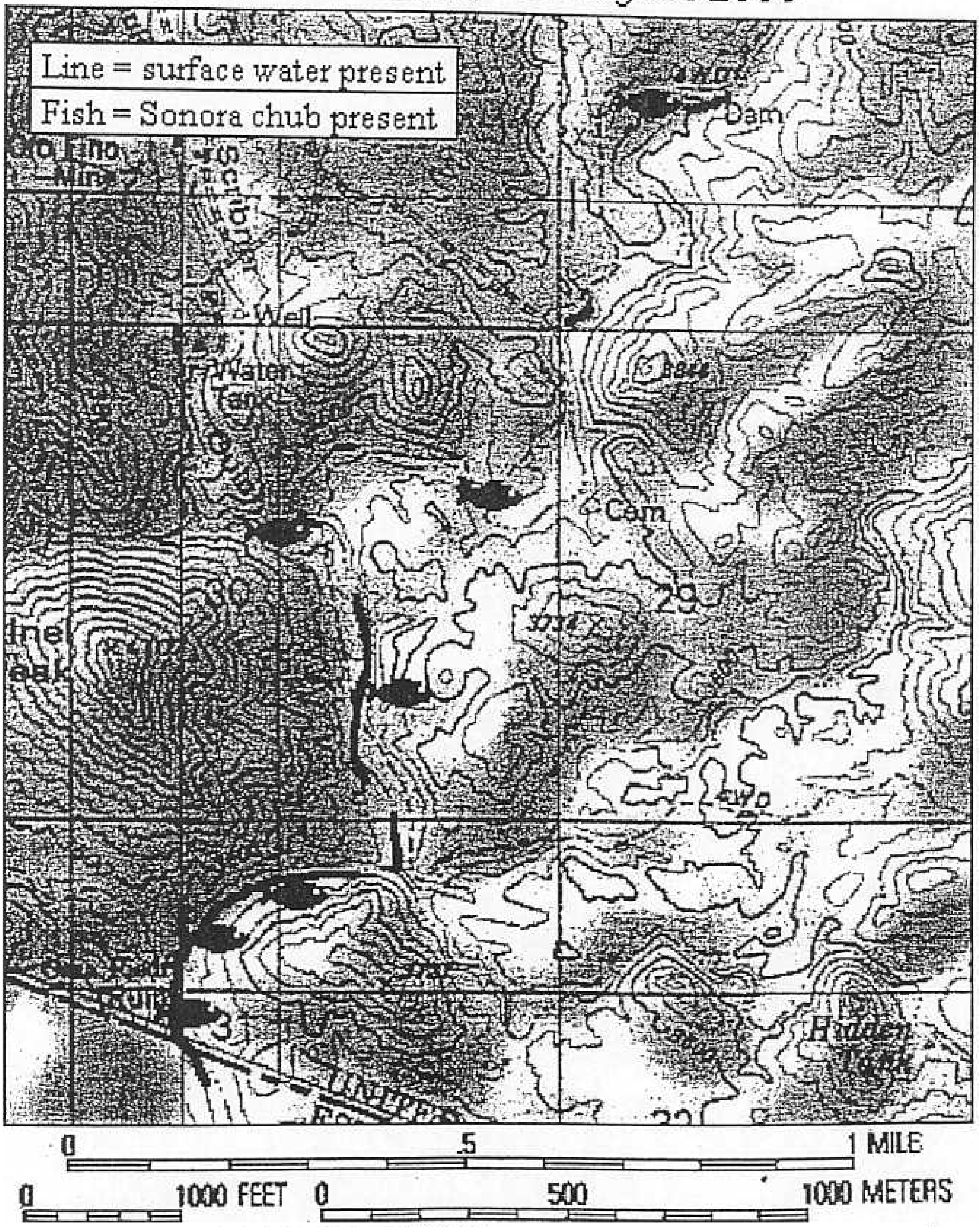
3. California Gulch, 11 August 2000



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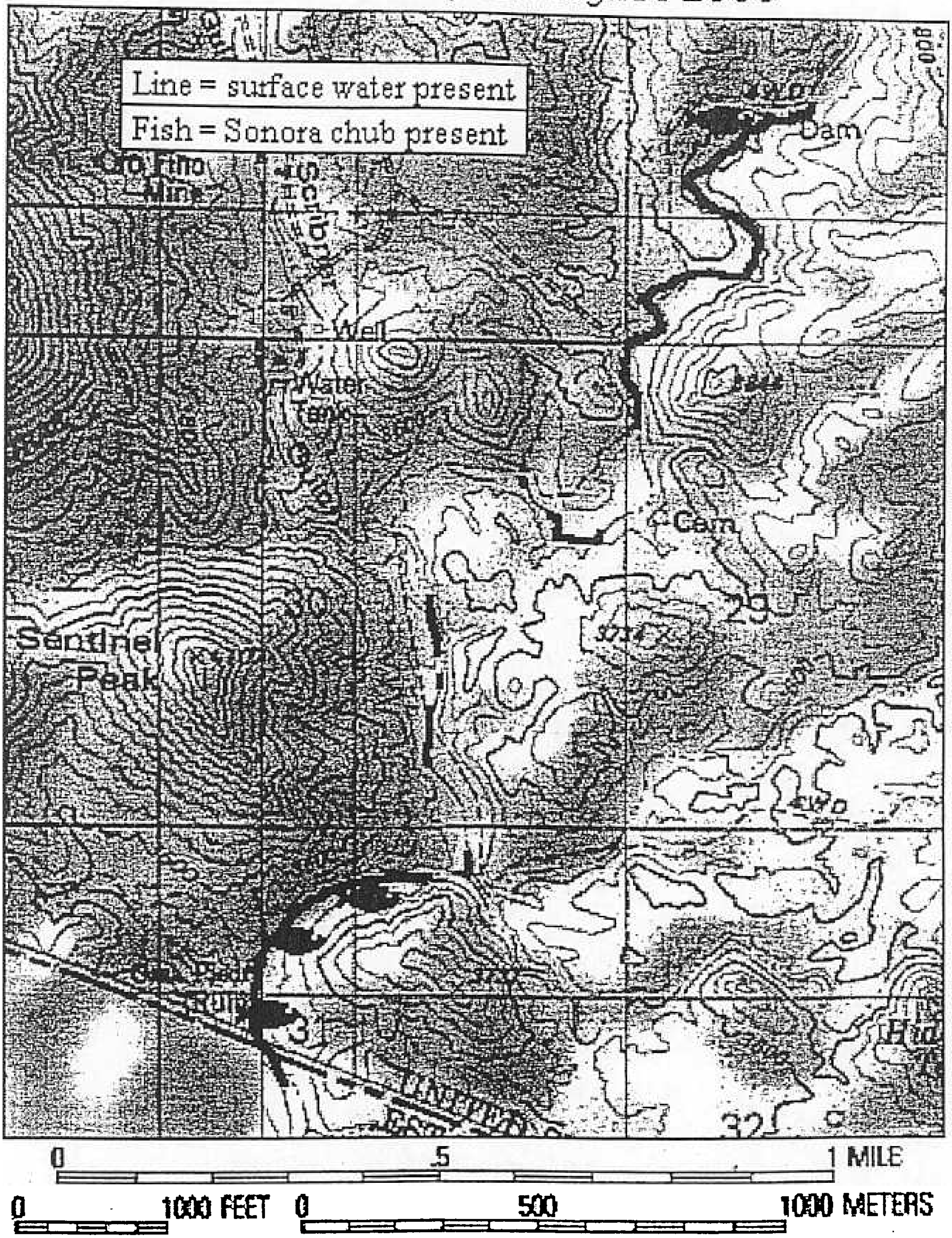
32

4. California Gulch, 18 August 2000



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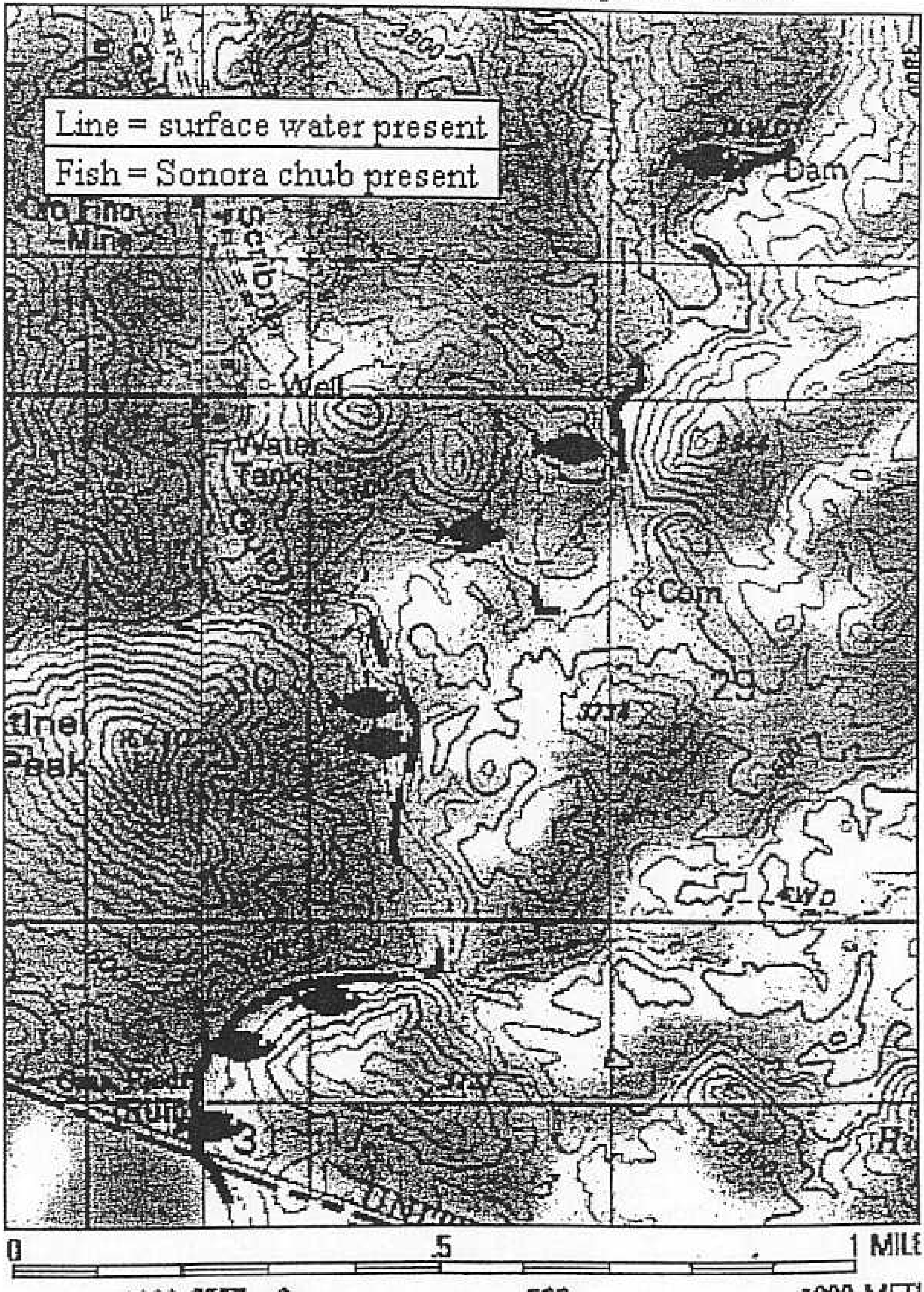
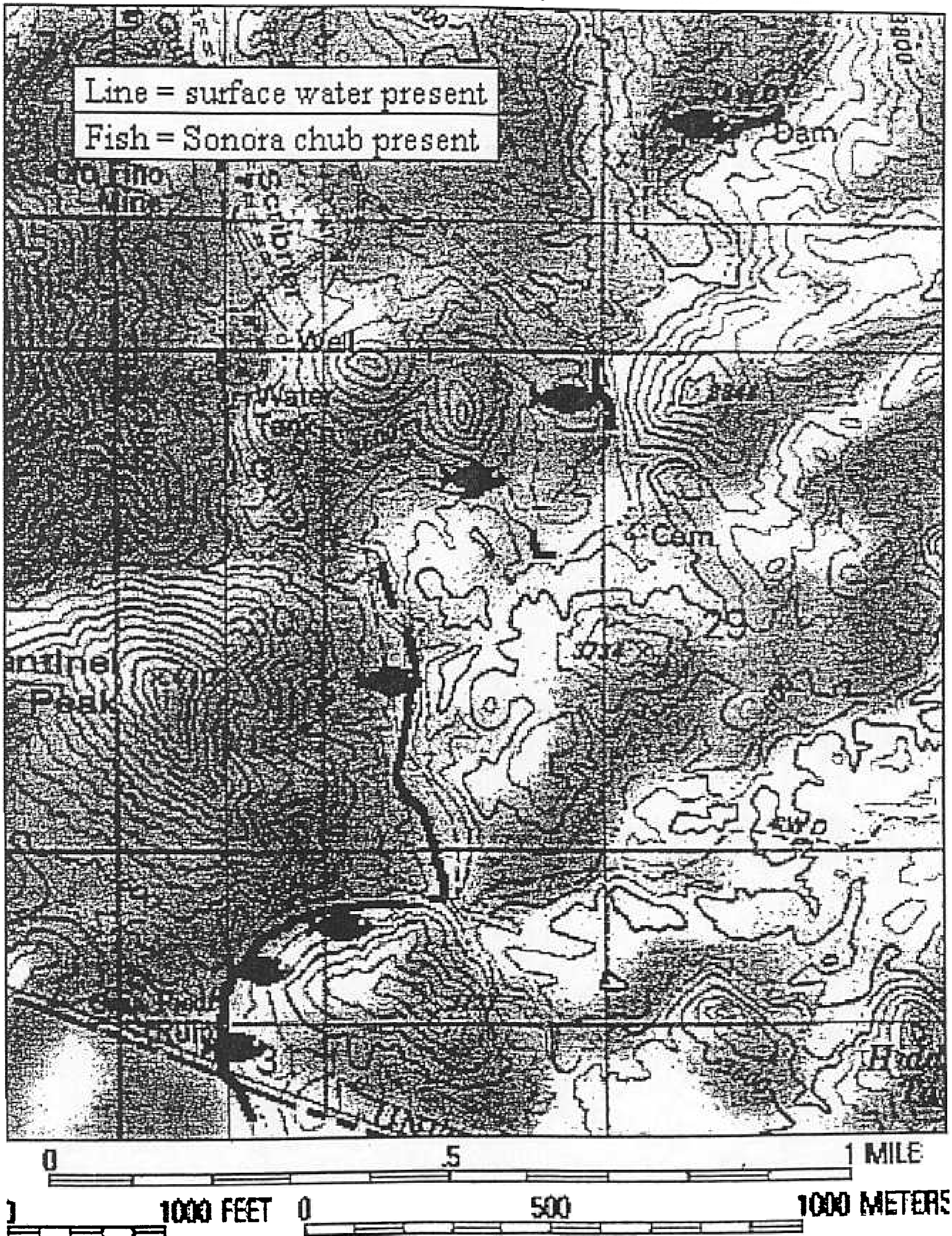
3e

5. California Gulch, 25 August 2000



3f

6. California Gulch, 1 September 2000



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3g

7.California Gulch, 3 October 2000